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The Changing Place of the Laboratory in Public Health*

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SOME of you may doubt if the laboratory's place in public health is changing sufficiently to justify my choice of title for this address. Others may feel too many changes are occurring for their course to be mapped; while some may even incline to the view that the changes are so much for the worse that the less said about them the better. The main purport of my theme will be that important changes have occurred, are occurring, and must continue to occur, in the place of the laboratory in public health; that these changes have hitherto largely resulted, more or less automatically, from the effects of the laboratory upon public health; and that the time has now arrived when it is expedient (for his own sake as well as that of the community at large) that the laboratory worker should take a more active part in ensuring that his findings are applied to the best advantage.

The micro-biological sciences to which most of us here owe allegiance are so young, especially in view of the plenitude and richness of the fruits they have yielded, that it seems permissible to introduce a few historical references to give atmosphere and background to my theme.

From Leonardo to Jenner

Let us cast our minds back about 4½ centuries to the year 1484. Henry

**Chairman's Address, delivered to the Laboratory Section, Canadian Public Health Association, at the annual meeting held in Toronto, December 18-19, 1941.*

VII is on the throne of England. In Italy, the Renaissance—the revival of learning—is in flower. Leonardo da Vinci, scientist and artist, 32 years of age, and in the prime of his creative genius, repairs to Milan to devise projects for reconstructing the city on more sanitary principles to combat the plague then decimating its people. In Verona, a one-year-old infant, Girolamo Fracastoro, escapes injury, it is said, when his mother, in whose arms he lies, is killed by lightning. Giovanni Battista Cibo, father of two children by a Neapolitan lady, ascends the Papal throne as Innocent VIII. The Pope promulgates a powerful and famous Bull ("Summis desiderentes affectibus") denouncing the appalling depravities reported from Northern Germany and the Rhineland, and nominating Inquisitors to look into them. The Inquisitors, Frs. Kramer and Sprenger, make a thorough job of their assignment, and publish, with the Pope's approval, a great work entitled *"Malleus Maleficarum"* (The Hammer of Witches), treating largely "of the three necessary concomitants of witchcraft, which are the devil, a witch, and the permission of Almighty God".

Eight years later, in 1492, Columbus discovers the New World, Leonardo prepares to paint his "Last Supper", and Innocent VIII is dying of senility. The Papal physician essays rejuvenation by transfusing the blood of three healthy young boys into the old man. The experiment, although unsuccessful, is conclusive, for the Pope dies, and so do the donors. I do not know the fate of the physician, but being a Jew he is presumably sent at least into exile. At any rate, after this inauspicious start, the letting and getting of blood is long barred by Church and State. Fortunately things are very different now. Today our blood can be both painlessly given and sorely needed, to save the lives of those who—victims of the megalomania of a few, and of the apathy of millions—cannot shed their blood, as we still can, in measured amounts.

Apparently Columbus and his men return from their journeys to the West Indies with syphilis. An epidemic of the great pox sweeps like a fire over Europe, then as nowadays in the wake of armed conflict, when Spanish mercenaries, infected indirectly through Columbus' sailors, fight for the King of Naples against Charles VIII of France. The French call it the Neapolitan disease, and the Neapolitans, not to be outdone in courtesy, call it the French disease. The Emperor Maximilian issues a mandate, following that interesting affair known to historians as the Diet of Worms, proclaiming that the disease is a manifestation of the anger of God against the prevailing sin of blasphemy.

By 1530, Girolamo Fracastoro has become a middle-aged gentleman of Verona, and is besides, a physician, a philosopher, and a poet. With this notable combination of talents, Fracastoro produces his famous poem describing, in Latin hexameters, the troubles that beset the swineherd Syphilus, who was smitten by the French disease for defying the wrath of Apollo. The poem displays a curious lack of epidemiological insight, but is interesting for the dramatic and sinister accuracy of its clinical descriptions, and for the fact that from it comes the present name of the disease. We now know that syphilis, like many another disease, is due more to the folly, ignorance and apathy of man than to the wrath of God. It can be detected, treated, prevented—in fact, abolished. Yet despite all the knowledge of syphilis accumulated since Columbus

returned to Europe from America, we have it endemic, even epidemic, in our midst today. We may wonder which of these facts furnishes the more discouraging evidence of the power of human folly, ignorance and apathy to thwart and deny human health and happiness—that in the United States, where all selective service candidates are being examined serologically for syphilis, 50,000 out of the first 950,000 blood specimens tested, or over 5 per cent, should have been positive; or that in Canada we should be unaware of the incidence of syphilis among corresponding groups, because we have stupidly failed so far to insist upon a compulsory serological examination of all recruits for the Armed Forces?

But to return a moment to Fracastoro, his failure to note the epidemiology of syphilis should not detract from the credit that is due him as a pioneer epidemiologist. For in 1546, as Henry VIII of England, fitted out with his sixth wife Catherine Parr, rots away from the combined effects of high living and syphilis, Fracastoro publishes his *"De Contagione"*, in which he discusses the transmission of infections by contact, by fomites, and from a distance, through the agency of "minute reproductive germs". He dies in 1553, and his work remains long forgotten.

At Pisa, 11 years later, is born Galileo Galilei, the star gazer, who during a lifetime spent in bringing the very large but distant near enough to study, concludes that the earth is not the centre of the universe. In 1632, four months after Galileo at the age of 68, crippled with rheumatism and an enormous rupture, is hauled before the Inquisition at Rome to answer charges of heresy, and is punished for his beliefs, and four years after William Harvey has published his discovery of the circulation of the blood, there is born at Delft, Holland, one Anton van Leeuwenhoek, who spends his life in making the very minute big enough to study. Van Leeuwenhoek is blessed with abundant patience, perhaps because he operates a dry goods store; but it is more difficult to account on this basis for his unquenchable curiosity and enthusiasm. He grinds small lenses as a hobby, and through them is able to see and describe, and show off proudly to his neighbours on Saturday nights, a hitherto invisible world of unimagined complexity. In a long lifetime of 91 years, which covers the momentous period in English history from Charles I to George I, he is known to make over 400 microscopes, with some of which he is able to achieve magnifications of 300 times natural size. The "little creatures—beasties—one thousand times smaller than the eye of a big louse", which he sees cavorting in the drop of clear rain water, in the tooth scrapings, the infusion of pepper-corns, and so many other fluids, are painstakingly described in a series of nearly 200 letters to the Royal Society of London, founded a few years before by King Charles II to replace an earlier body of scientists, or experimental philosophers, who held meetings under the rather apt name, "The Invisible College". Incidentally, it is to this College that Pepys refers in his diary in 1667, a year or two after the great Plague of London, . . . "to a tavern and good discourse of a man that is a little frantic that the College have hired for 20/- to have his blood taken out and some blood of a sheep let into his body". Evidently the leaven of Harvey's discoveries, announced 40 years before, was counteracting the ban of Church and State, at least among the experimental philosophers. A few days later,

Pepys records: "I was pleased to see the person who had his blood taken out. He did give the Society a relation thereof in Latin, saying that he finds himself better since, but he is cracked a little in his head . . ." Anton van Leeuwenhoek is the first microbiologist to bear on his escutcheon that proud motto "O world invisible, we view thee", which Francis Thompson has supplied for the inspiration of the bacteriologist and mystic alike; and he gives posterity the first clear glimpse of one part the laboratory is to play in public health: the search for and differentiation of micro-organisms, hostile, harmless, or helpful to man.

Contemporary with van Leeuwenhoek, a pioneer whose name and letters are familiar to you all, is one Samuel Bennett, an unknown practitioner, whose sole claim to recognition on this occasion rests upon the fact that I happen to have found in Vancouver, and have with me here, his personal note-book, the contents of which throw an interesting light upon the prevailing maladies, remedies, and incidentally, fees of the time; and serve to emphasize the great gulf fixed then, as now, between pioneer and practitioner—if you will, between laboratory discovery and its effective application. The entries in the book extend over a period from 1646-1699, beginning just before the beheading of Charles I, covering the Protectorate of Cromwell, the Restoration of Charles II, the abdication of James II, and ending three years before William followed Mary to the grave. Gloomy nostrums for the sick are interlarded with pleasant recipes for the kitchen. There are treatments for such specific ailments as "scurvy, a quartane ague, the bitting of a mad dog, the goute, worms in children, the stone, the King's evill, a consumptive cough", which we can certainly improve upon today. But it is doubtful if we can better the nearby instructions respecting the making of "quince cakes, orange water, blackberry wine, marmalade of cherrys, jelly posset or almond butter" . . .

In palliative treatment, Bennett goes to curious lengths, but then, so do we sometimes. There is "an excellent powder to purge the braine", and another "for the burning of the stomach"; there is both a means "to take away pimples and heat out of the face", and another for "breaking in children or for grown persons" which I will gladly impart to any anxious enquirer. Moreover there are numerous ways of "opening the body when bound", and likewise of coping with "gripping of the guts", which I should judge would be extremely efficacious. Where Doctor Bennett falls down badly is in his prophylaxis. He shows no trace of the preventive outlook foreshadowed by the work of his predecessors Fracastoro and Harvey, or of his contemporary van Leeuwenhoek. For instance, "To keep the smallpox from hurting the eyes", you must "Take cummin seeds and chew it in yor mouth and go breath into there eyes this did it for Goody Gentle's daughter".

Again there is a prescription of numerous rather exotic components, dated 1675, ten years after the Great Plague of London began, and headed "Against epidemicall disseases as the plague, etc.", which instructs us "Take one spoonfull of the medicine every morneing, and then walke abroade and followe your affaires, etc." Samuel Bennett's cousin Phillip appears to have entered this prescription in the book during a visit to the country from town, for beneath it

in the same handwriting is the following testimonial: "Cousin Bennett: I used only this water and wormewood Ale with a Rue posy in the great plague last in London and (by God's blessing) escaped, yet some of my ffriends were infected, and I kept them company. I am yor loving kinsman Philip Bennett". I frequently receive in the mails, as no doubt many of you do, samples from pharmaceutical manufacturers whose testimonials—although printed, literally and metaphorically, in glowing colours—are far less convincing than Phillip Bennett's, for the present-day empiricist makes no reference to the potency of God's blessing. Extract of Horse Chestnut, for instance, for high blood pressure and varicose veins at a dollar an ounce! Samuel Bennett's ministrations may have been no more scientific, but they were far cheaper. "Catherine Hebdith", for example, "she lame and her husband shoulder out", we find charged fourpence. There was "the woman of Martok" tended for an unspecified ailment for threepence; while "Robert Tolman" was opulent enough to be levied ninepence for "ye broken bone in the leg".

Let us return to the point that Doctor Bennett, the practitioner, was far behind the pioneers of his own times. This is to some extent understandable and excusable; for in his day the means of conveying knowledge were limited and slow, and the opportunities of gathering it confined to a few scholars. But for a picture of how unnecessarily slowly knowledge does diffuse from pioneer to practitioner let us pass on another 100 years.

In 1767, George III is on the throne of England, not yet insane, but driving the American colonies to think in terms of their independence. At the University of Padua, the Professor of Natural History, Spallanzani, engages in a lively scientific controversy, spiced with invective, against Joseph Needham, an Irish priest, over the problem of spontaneous generation. John Hunter, protagonist of the experimental method and inductive logic in medical science, inoculates himself with gonococcal pus, and seeks to determine whether or not gonorrhoea and syphilis are the same disease. He gets both diseases, though he does not realize it at the time, as has occurred in very many cases since Hunter's day, and dies 26 years later of the aortic aneurysm thus acquired.

In the same year 1767, one Seth Alden (a direct descendant of the John Alden who came over on the Mayflower) begins to serve his apprenticeship with Dr. Joseph Perkins, a physician of Norwich, New York. I have with me here the certificate testifying to satisfactory completion of his three years' training, signed by his master, which was all he required to permit him to practise medicine; and also a notice of the auction sale of his pathetically few goods, following his death in 1832, signed by Felix Alden, who being a canal toll collector and a moneylender as well as an auctioneer, was far more prosperous than his elder brother. And here too is Seth Alden's personal notebook of prescriptions, compiled during his apprenticeship.

The interesting features of Seth Alden's prescriptions are that they differ in no important respect from those of his prototype Samuel Bennett 100 years before. They are for the same kind of ailments, they include at times even more extraordinary ingredients, and they betray the same obsession with empiricism based on the alleged cure of a single prior case.

We find numerous references to scurvy, dysentery, convulsions, consumption, and hydrophobia, all obviously very prevalent then. Interspersed with quite classic clinical descriptions of these conditions, are such curiosities of materia medica as the following: "For phthisis or asthma: Skoonk Cabage root, well saved, in fine poud. gr. 30, give it morning & evening in a Tea of Hysop" . . . Or, as "A Certain Cure for the Hysteric Collic" is recommended New England gentian steeped in the urine of a Red Heifer"—to be taken ad lib. Beneath is appended this note: "Oyl of Golden rod more Eligant and as Excellant". The last entries in the book are "receipts to make an Electuary and a Bear for Capt. Cody—sick of a Pulmonary Consumption, with Hypocondrick Symptoms". To these recipes is added an admonitory afterthought . . . "Hold a Cat to his mouth, so that he may breath into the Cat's mouth when he is a Sleep for the space of half an hour at a time". Beneath this, significantly enough perhaps, is written the word "Finis". It is hard indeed to reconcile this jumble of therapeutic necromancy with the patient, intelligent, and courageous investigations of the contemporary Hunter, of Harvey 50 years before, or of van Leeuwenhoek 100 years before. Still harder is it perhaps to imagine that while Seth Alden goes about his affairs, tending the sick, on this side of the Atlantic, Edward Jenner is also practising his profession on the other side, but with more attentive ears and eyes, preparing for the day in 1796, when with the advice and connivance of his friend and teacher, John Hunter, he performs that bold experiment in active immunization, which again gives notice to posterity of another part the laboratory is to play in public health, the devising and perfecting of agents for specific protection against infection.

Pasteur and Koch

From now on the line of succession is clear and more familiar, although progress is halting, even retrograde at times, as it has been throughout history. In 1822, one year before Jenner dies, Louis Pasteur is born at Dôle in France, while Robert Koch is born in 1843 at Krausthal, Germany, twenty years after Jenner's death. In Paris, little more than a year ago, Joseph Meister, for many years janitor of "Le service pour la rage" at l'Institut Pasteur, commits suicide. Meister it is who, as a boy of nine, badly bitten by a rabid dog in Alsace, is brought for treatment, and owes his life, to Pasteur. Now, cut off at the age of 64 from all contact with his relatives, who had fled the capital before the German occupation of Paris, he severs with his own hands a direct link with Pasteur.

All of you know the accomplishments of Pasteur and Koch. I shall therefore not particularize. Suffice it to say that in the last quarter of the 19th century, these two men, ardent patriots and therefore bitter rivals, plant in a firm foundation of science, a grove of fast-growing trees—trees of bacteriological and immunological discovery—from which they and their pupils shake down showers of life-giving fruit; and there were of course some windfalls. After the close of the century, pupils of Pasteur and Koch, and their pupils in turn, go on shaking those trees with good but diminishing returns; and doubtless there are still many good fruits to be plucked by the discriminating, the indus-

trious, the intelligent and the bold. But we have brought ourselves up-to-date, indeed, to some extent, into this very room, and I shall not be presumptuous enough to attempt to describe to you those fruits which remain on the trees, or to suggest how they might best be gathered. If I knew enough to undertake this task, I should be busy working at home now, instead of attending this meeting for enlightenment from my friends and colleagues. Besides, it seems to me that many laboratory workers are suffering already, as it were, from acute indigestion, while many public health officials in the field are only too prone to anorexia; and the main purport of my remarks is to urge a narrowing, rather than a widening of this gap, this disparity, between the overstuffed and the undernourished; between the laboratory worker at his bench, and the public health official behind his desk or in the field; or, as we have seen it manifested through the centuries, between the pioneer and the practitioner. Do not take me to imply that the present-day laboratory worker knows too much, and the field worker too little. Sometimes the reverse is true. Moreover, there cannot be too much knowledge, provided there is the wit and wisdom to use it well. I was alluding rather to the general tendency for our work to involve us in so many controversies of fact-finding and fact-significance, that we are liable, as it were, to surfeiting, becoming incapable of giving clear-cut advice, and sometimes perhaps indifferent to the need for giving it; while the public health worker outside the laboratory may be involved in so many conflicts of personality and prejudice that he is tempted to seek refuge in procrastination, which ends in forgetfulness and stultification.

The Public Health Laboratory Today

Now that our historical background is sketched in, let us take a few analytical glances at the present place of the laboratory in public health. I suppose the main professional objective of most members of the Laboratory Section of the Canadian Public Health Association, in simple and general terms, is to understand with a view to preventing or undoing those special kinds of host-parasite relationship which are termed infections, and which result in disease and often death of the host. The parasite may of course be a worm or an insect, but more commonly is a representative of the "world invisible"—mould, yeast, protozoon, spirochaete, bacterium, rickettsia, or virus; while the host is usually human, but may be of some other animal species, wild, domestic, or laboratory. No matter what the parasite, or what the host, the prevention or cure of infection depends upon the satisfaction of one or more of the following requirements:—

1. The presence of the parasite in the environment of the potential host must be determinable.
2. The parasite must be destroyed before it reaches the portal of entry to the potential host; or alternatively, the route of conveyance must be blocked.
3. The portal of entry of the parasite into the host must be shut off or successfully defended.

4. If it gains a foothold, the parasite must promptly be destroyed by the local defence mechanisms of the host, or must establish a symbiotic relationship with the host, who thus becomes a "healthy" or "passive" carrier.
5. If it establishes itself in the host, the parasite must ultimately succumb to the combined effects of general inflammation and acquired immunity in the host, and of specific therapy; or must establish a symbiotic relationship with the host, who thus becomes a "convalescent" carrier.

Should the foregoing sequence of requirements fail to be met, then it is the host which will succumb, after an interval determined chiefly by the parasite's power to multiply, or to produce toxic metabolites, in the tissues of the host. Under this conception, the main public health functions of the laboratory are to facilitate the satisfaction of those requirements, and to help circumvent such factors as may prevent the requirements being met. Let us then consider some of the problems which face the laboratory today as it tries to fulfil these functions.

First, there are those problems which arise (chiefly and inevitably, in the public health laboratory) in the course of attempts to isolate, or at least to recognize the presence of, the parasite. Many of the best of the early fruits on those trees we were speaking about represented methods of identifying parasites already established in the human host. The morphological and functional characteristics, the growth and survival requirements of these agents, were determined, often in extraordinary detail. The prime function of the public health laboratory then was the diagnosis of infection, through isolation of the causal agent of diphtheria, tuberculosis, typhoid fever, dysentery, gonorrhoea, or whatever it may have been, from a sick person—and there was a fully adequate supply of persons with typical infections to keep the laboratory busy. We now know a good deal concerning the causal agents of at least a majority of the current human infections. Moreover, when laboratory help in diagnosis is sought too late for the agent to be grown; or when, as in brucellosis, the agent is troublesome to grow; or when, as in syphilis, the agent will not grow at all on artificial laboratory media—a curious display of fastidiousness in a pathogen so catholic in its tastes once inside its host!—we can usually turn to some test for a specific immunological response.

I should interject here that admittedly, this claim applies far less to the field of virus infections, which present too many big difficulties, in my opinion, to warrant such work being undertaken by public health laboratories as now organized in Canada. The tendency of a given virus to change its tropism; the capacity of different viruses for evoking the same clinical and pathological responses in the human or animal host; the apparent sharing of some antigenic components by many viruses of otherwise distinct characteristics; the strange menagerie of experimental animals that may be needed in virus work; and finally, the extreme care required to ensure strict isolation of such animals, both before and after use—all these may be adduced as arguments for reserving the marvellously-complex field of virus work, as we know it today, for the well-equipped research institution.

But to return to our argument, as the implications of all the accumulating knowledge of these agents of disease struck home to Sanitarians, interest was awakened in such questions as their sites of elective localization within the host, their modes of access to the host, and their favoured habitats outside the host. There resulted a change of emphasis, away from the sick person, and towards his past and potential contacts—a change which is becoming steadily more pronounced as the diseases in question diminish in incidence: a diminution of incidence, we do well to recall, basically due to the success of the public health diagnostic laboratory in securing early identification of at least the bacterial and spirochaetal infections, and to the success of the research and biological-manufacturing laboratory in producing specific means of preventing and curing such infections. It is this shift of concern from the sick individual to his healthy neighbours which largely accounts for the paradox that although certain communicable diseases have markedly diminished in incidence, the numbers of public health laboratory specimens examined which relate to those diseases yet continue to mount.

The "Routine Test"

The laboratory evidence of this shift of interest is seen first, in the considerable diversion of time and interest to the examination of milk, food, and water supplies for the presence of pathogens, or for presumptive evidence of their presence; and secondly, to the routine testing of specimens from unsuspected cases of infection. A considerable part of such "routine testing" involves specimens sent in by practitioners, whose eagerness to share the burden of their many puzzling cases with some anonymous laboratory worker is matched only by their impatience to be made acquainted later with the meaning of the reports submitted. Such work brings its occasional reward to the worried practitioner, but the laboratory is saddled meanwhile with an absurdly high number of unnecessary tests on improperly-taken and anyhow negative specimens.

This tendency is too familiar to any worker in a public health or even a hospital laboratory to need exemplification. We must endeavour, for our own sake as well as that of the practitioner and of the public, to curb such abuse of laboratory facilities, such prostitution of the good name of medical science. I have little faith that this can be brought about (except long after we have all passed on) by better education of the medical student. For there seems at present little likelihood of the student curriculum being sufficiently revised in content and emphasis to ensure a proper respect for, and acquaintanceship with, laboratory problems and attitudes; while the exigencies of practice seem to compel the best of former students to turn upon the laboratory at times, in baffle-ment and spleen. Must we not rather admit that the basic reasons for misuse, or abuse, or even failure to use, the resources of the public health laboratory, lie in a misunderstanding of its objectives, perhaps at times in a disrespect for its personnel; and that the onus now lies on us to promote the better recognition we need, and on the whole deserve?

I have referred at some length to this matter because many of us who are interested in public health laboratories know only too well that the work of

our institutions is so hampered by irrelevant requisitions and unsatisfactory specimens, that there often seems no time even to protest, let alone to plan the more worth-while types of routine-testing projects, including those surveys which might so profitably be carried out in co-operation with health officials and practitioners, as well as with the medical personnel of the Armed Forces and of hospitals; and ranging from examination of a series of water samples from a dubious source of supply, to identification of the types of haemolytic streptococci isolated from throat swabs taken on the wards of a fever hospital; from the examination of stool cultures from food handlers in public eating places, in areas where enteric infections are endemic, to routine serological tests for syphilis on at least pre-marital and maternity groups, recruits for the Armed Forces, and university students. As trends go, we must expect demands for more mass or routine surveys of these types. We should encourage and do our best to cope with such demands, within limits and under certain provisos, which I venture to suggest should be as follows:

1. Mass or routine surveys should be undertaken only after full discussion of the scope, timing, and purpose of the project between the laboratory director and the other interested parties.

2. The information likely to be yielded should have a potential value to the health of the community fully commensurate with the cost to the laboratory (and therefore to the community) of doing the work.

3. Some definite assurance should be received before commencing any such project that the information obtained will be effectively applied, and not shelved or gainsaid.

On paper, these seem such fair and reasonable conditions that one mentions them only because they are so frequently and flagrantly transgressed.

Granted these prerequisites, we must still face the dilemma presented by the fact that as the laboratory undertakes more surveys involving apparently normal persons or animals, not only must its criteria of negativity be adjusted to a sufficient level of sensitivity to reveal borderline reactions (hence automatically leading to enquiries about the significance of "doubtful" or "suspicious" reports) but also, its criteria of positivity must be qualified and supplemented by reliable methods of distinguishing between, for instance, pathogenic and non-pathogenic strains of identical morphology and cultural characteristics, or between "true" and "false" positive serological reactions. In other words, while such mass or routine surveys usually yield a high proportion of negative reports, which although tedious are within limits categorical, they also tend to uncover a certain proportion of doubtful, and even pseudo-positive specimens, requiring further and often complex examination. As examples of these points, it is hardly necessary on this occasion to do more than mention the sero-diagnostic tests for syphilis, the cultural method of diagnosis of gonorrhoea, and the examination of naso-pharyngeal swabs for diphtheria bacilli, haemolytic streptococci, or meningococci.

The solution of the above dilemma cannot be brought about without closer collaboration between the laboratory worker and the epidemiologist—a collabora-

tion so close that I think it can best be provided by placing the epidemiologist on the staff of the laboratory; or better still, by making any appointment to the laboratory staff as epidemiologist contingent upon a previous laboratory training. Such a person, when investigating an outbreak, or conducting a survey, will know what specimens to take, how and when to collect them, what tests should be done on them, (if necessary, being prepared to do the tests himself), how to interpret the reports obtained, and what advice to found on these reports. We do not want too many epidemiologists whose chief functions, despite the undeniable importance of such efforts, are the compiling of convincing itineraries to cover where they went and what they did on their latest peregrination, or the drawing of morbidity and mortality charts to show with elegant clarity the trends of incidence of human misfortunes and mistakes.

Before we leave this discussion of the influence which routine surveys are exerting, and will increasingly exert, in changing the place of the laboratory in public health, it should be noted that broadening conceptions of the part played by animal reservoirs in the maintenance and spread of human infection will inevitably lead to an increased demand for surveys involving animals, domestic and wild. Present knowledge of, e.g., yellow fever, malaria, rabies, plague, tularemia, typhus fever, Rocky Mountain spotted fever, encephalomyelitis, leptospirosis, and brucellosis, reveals the causal agents lying dormant in a previously unsuspected variety of intermediate animal hosts, with a surprisingly wide assortment of mosquitoes, lice, ticks and fleas often acting as insect vectors. Already certain surveys in this field are being conducted in Canada, by the Laboratory of Hygiene for plague and Rocky Mountain spotted fever, and by the Dominion and certain Provincial Departments of Agriculture for Bang's disease in cattle. But there are large gaps and some insularities in the arrangements, while the Bang's disease surveys are carried out from the standpoint of agricultural economics rather than of public health. Such surveys obviously provide opportunities for more co-operative investigations, in which research foundations, university departments, and public health laboratories could all help to round out, strengthen, and cause to be applied the good work of the Laboratory of Hygiene, and of the Health of Animals Divisions of Departments of Agriculture.

The Laboratory Worker as Pioneer and Prophet

So much for reflections arising around that first prerequisite to the prevention or cure of infection, namely, determination of the presence of the pathogen in the environment of the potential host. The occasion calls for much less comment on the role of the laboratory in securing the other prerequisites. A few words seem in order concerning the laboratory's function of determining whether or not the pathogen has been destroyed along the route of conveyance to the potential host, and before it reaches the portal of entry. This function is exemplified in the bacteriological examination of milk, water, shellfish, and occasionally other foodstuffs—usually for presumptive rather than actual evidence of the presence of the pathogen. In this work particularly, laboratory

findings are of no avail unless they are acted upon according to established principles of sanitation; and it is here that the public health executive too often disappoints his laboratory colleague. I cannot believe that the director of a public health laboratory should be content, or even quiescent, if nothing be done, after repeated submission of evidence that, for instance, a city's milk supply is not safe, or its water supply not good, or its rat supply a menace. Indeed, in my view, it is his duty to help find ways and means—even though they be perhaps a trifle unorthodox—of getting action. Just as attachment of the epidemiologist to the public health laboratory would represent a desirable development, there is much in favour also of the sanitary engineer being attached to the public health laboratory, with a view to securing more immediate action against defects of community sanitation revealed or verified by the laboratory. But of course no such arrangement can alone effectively substitute for the proper exercise of their right to take action by public health officials in the field, or behind their desks; and we are all familiar with the occasionally lamentable reluctance of such officials to exert the powers conferred upon them by Health Acts, or by sanitary by-laws or regulations. The effect of such reluctance upon their laboratory colleagues is to tend to transform them into automata, content to spend much of their days in furnishing pigeon-holes with potentially useful information. If the world is in danger of being ruined by a few political sadists, is this not in large part due to the political masochism—the readiness to be trampled on, or to tolerate abuse of associates, or to see nothing done where quick and firm action is needed—of too many of the rest of us? As Irene Baird says somewhere in her novel "John" . . . "Once men commanded from the strength of their legs, now from the security of their buttocks"; and, one may add, when their buttocks feel insecure, they make no attempt to command.

I shall have little to say regarding the place of the laboratory in determining how the portal of entry to the host may be successfully defended against the pathogen. This is clearly a field for further investigation by the research laboratory, but so far we must admit the results have been rather disappointing, perhaps because here especially, in the defence of his own portal of entry, the host must play so vital a part. Such defence involves an understanding by the host of the public health significance of the peculiar and common customs and habits of mankind, some bearing the mark of folly, ignorance, poverty, or just apathy; some laughable, some pitiable; some sordid, some romantic—but all giving colour and character to human life. We can neither expect such understanding by the host, nor any new and important urge towards truly hygienic modes and patterns of human behaviour, without more clamant, authoritative, and courageous types of public health education than those now current.

Finally we come to the last two of our five prerequisites to prevention of death of the host from infection by the pathogen, namely, the limitation of the infection through destruction of the pathogen by the local defence mechanisms of the host, and the undoing of the host-pathogen relationship even after it has been set in train, through some combination of general inflammation, acquired host-immunity, and specific therapy. The public health and hospital laboratories

will both be involved here, but only in establishing the diagnosis. Thereafter the problems involved concern the research laboratory, and I shall not presume now to attempt to outline their tremendous scope. But before closing, I feel impelled to express the view that from some standpoints the sudden and violent resurgence in recent years of chemotherapy seems regrettable. Not that the sulpha-drugs have not their valid place, or their real triumphs, in the limiting or undoing of the host-pathogen relationship. But they inevitably tend to divert attention from the study of those basic immunity mechanisms whose significance is still shrouded in so much mystery. Therefore I would suggest that in our investigations into the effects of specific chemicals, and of specific biologicals, in the host-parasite relationship, we should not merely concern ourselves with what such agents can do alone, but rather with why they cannot be expected to accomplish certain things alone, and with how the two types of agent might with advantage be used in conjunction. If the practitioner is nowadays too inclined to consider the merits, the laboratory worker should rather be preoccupied with the defects, of a given therapeutic or prophylactic agent. If the former seeks assurance that some rule is applicable to his case, the latter should nowadays not hesitate to aver that there are exceptions to every rule in infection and immunity. Perhaps this is a theme which some future Chairman of this Section may develop in his address.

Meanwhile, as he goes about his affairs, the laboratory worker, bearing in mind always the nobility of his traditions and objectives, should neither doubt the complexity of his tasks, nor dispute the need to shoulder with a readier courage and fluency the responsibilities of the pioneer. Perhaps it will yet be many years that we, like the others on our side, must try to rejoice—as though pathogens were being exterminated—in the death of mankind on the other side. But meanwhile we should look forward to the day when all that must pass: when we may restore to full meaning in our hearts that great thought from John Donne: "Any man's death diminishes me, because I am involved in mankinde" . . . Else life itself, to all of us as members of this Association, and to many of us as human beings, might seem bereft of purpose.

Half a Century of Diphtheria Prevalence in Quebec*

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THERE is a man attending this thirtieth meeting of the Canadian Public Health Association whose presence should be especially noted and who deserves an exceptional tribute of respect and admiration from this younger generation of hygienists; he has been the pioneer of public health in this province, the heart and soul of the old Superior Board of Health, of which he has been the secretary from the day of its foundation. His name is on your lips: Dr. Elzéar Pelletier, the Dean of our personnel.

In the first Report of the Superior Board of Health, for the years 1885-1895, Dr. Pelletier wrote what follows on diphtheria:

"Of all the communicable diseases, diphtheria is the most prevalent in the province. It is an endemic disease, with cases one day here, the next day over there, but there is not a locality where it has not made havoc . . . Diphtheria is one of the most deadly communicable diseases. Each year the number of its victims among children is momentous. It is one of the more important factors of mortality in the Province . . . During the past seven years diphtheria has not been pandemic in our province, though there has not been a single year without disastrous outbreaks in different localities, whether close together, or far from one another and attacking one or many regions at the same time . . . However, diphtheria has certainly decreased in this province in the past few years—mortality from this disease has lessened by more than half . . ."

What was then the state of mortality of the disease that moved Dr. Pelletier to such gloomy reflections? Let us go back to the end of the nineteenth century, to the year 1895, when mortality from diphtheria had decreased by more than fifty per cent, according to Dr. Pelletier's evidence.

The population of the province was then 1,492,099; Montreal had 253,418 inhabitants, Quebec 63,366, and Trois-Rivières 8,644. When you are familiar with the actual figures of 3,310,000 for the provincial population, 920,000 for Montreal, 152,500 for Quebec, and 42,000 for Trois-Rivières, you will understand that we are going back half a century into history.

In 1895, there occurred in the Province—and please, remember it was a favourable year—2,243 deaths from diphtheria, a specific mortality rate of 150.3 per 100,000 population; in Montreal, 443 deaths with a rate of 174.8; in Quebec, 46 deaths with a rate of 72.6, and in Trois-Rivières, 5 deaths and what looked like a very decent rate of 57.8.

No reliable figures are available for the previous years, but from that date

Presented before the Section of Epidemiology and Vital Statistics at the thirtieth annual meeting of the Canadian Public Health Association, held in the City of Quebec, June 9-11, 1941.

to the present year the Division of Vital Statistics of the Province has made an annual tabulation of deaths from diphtheria. The following table gives for each year from 1894 to 1940 inclusive the number of deaths from diphtheria and the specific mortality rate per 100,000 population.

TABLE I

DIPHTHERIA MORTALITY RATE PER 100,000 POPULATION IN THE PROVINCE OF QUEBEC 1894-1940 (INCLUSIVE)

Year	No. of deaths	Rate per 100,000 population	Year	No. of deaths	Rate per 100,000 population	Year	No. of deaths	Rate per 100,000 population
1894....	1,637	106.7						
1895....	2,243	150.3	1910....	630	32.0	1925....	359	14.0
1896....	2,059	131.4	1911....	582	29.0	1926....	367	14.0
1897....	2,088	131.9	1912....	471	23.1	1927....	469	17.6
1898....	1,709	106.8	1913....	539	25.9	1928....	413	15.2
1899....	1,299	80.4	1914....	654	30.9	1929....	401	14.5
1900....	1,035	63.4	1915....	656	30.5	1930....	309	10.9
1901....	858	52.0	1916....	555	25.4	1931....	305	10.6
1902....	813	48.3	1917....	509	22.9	1932....	191	6.5
1903....	986	57.3	1918....	405	18.0	1933....	124	4.2
1904....	869	49.5	1919....	452	19.7	1934....	125	4.1
1905....	849	47.4	1920....	727	31.3	1935....	151	4.9
1906....	920	50.3	1921....	775	32.8	1936....	159	5.1
1907....	577	31.0	1922....	686	28.4	1937....	278	8.9
1908....	669	35.2	1923....	590	24.0	1938....	302	9.5
1909....	515	26.6	1924....	433	17.2	1939....	219	6.8
						1940....	118	3.6

Let us consider for a moment the fact that from a rate of 106 in 1894 the mortality increased to 150 in 1895. For the two following years the rate was 131.

One cannot help wondering to-day at the experience the people of that period had to go through; it surpasses our understanding and we think about their situation with sympathy and bewilderment. Of course, we have all heard stories of that time, where two, three or four children in the same family were wiped out within a few hours or a day or so.

The specific microorganism, *B. diphtheriae,* had been discovered ten years previously, in 1884, by Klebs and Loeffler and the discovery had led to scientific researches by distinguished scholars of many countries. We owe the discovery of antitoxin to the labors of von Behring and of Roux. The latter had just made his epochal speech announcing to the scientific world at the congress of Budapest (September, 1894) that in collaboration with Martin and Chaillou he had succeeded in the preparation of an active and curative serum.

Medical men of the whole universe were conversant with this discovery and the experiments of Roux in Paris were followed with anxiety. His tests were indeed successful and from everywhere he was requested to supply serum. In the Province of Quebec as elsewhere, the medical profession, under the pressure of public sentiment, wanted to use this miraculous serum. Had not Roux' anti-

toxin decreased a fifty per cent mortality at l'Hôpital des Enfants Malades and a sixty-six per cent fatality at l'Hôpital Trousseau to 26 and then to 11 per cent in serum-treated children?

The Superior Board of Health, with a reserve as to the curative value of the product, contacted monsieur Gibier, the Director of l'Institut Pasteur in New York in February, 1895, and was able to get a supply of serum, prepared according to the French method, for distribution to the doctors who had placed a request with the Board. A little later (March, 1895) a stock was placed in some drug stores of Montreal to make the treatment generally available and lower its cost.

The following series of graphs shows the decrease of mortality from diphtheria in the Province, from 1894 to 1940.

The mortality prevalent in pre-antitoxin days (1895-1899) is shown in figure I). Any comment that could be made would not add to your speculative amazement on the scourge that afflicted our fathers.

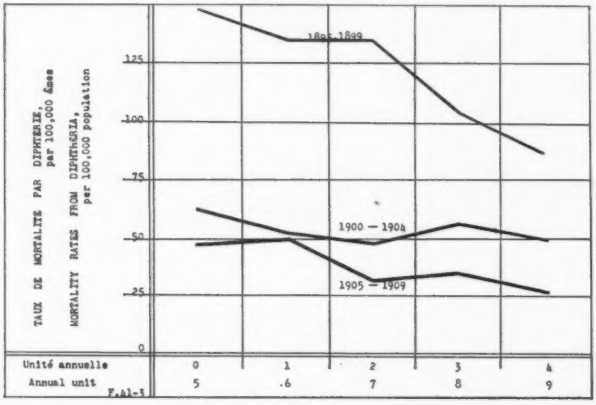

FIGURE I

Province of Quebec: Mortality from Diphtheria by quinquennial periods

In this graph the five-year period 1900-1904 is placed in comparison with that of 1895-1899. The years 1898 and 1899 show signs of a decrease, which is intensified in the later period. The first evident results of serum therapy were thus obvious in our province.

The five years 1905-1909 show a decrease in mortality in comparison with the period 1900-1904. The use of antitoxin was becoming prevalent in the province, but contacts were not passively immunized in sufficient number.

For the five-year period 1910-1914 the mortality is around 30 per 100,000 (figure II). In the last year of the period, that is in 1914, the mortality rate is higher, for the first time since 1895, than the one of the corresponding year in previous periods.

The five-year period 1915-1919 shows the lowest mortality yet observed.

The mortality from diphtheria for the period 1920-1924 is higher than that of the two preceding periods, that is 1915-1919 and 1910-1914.

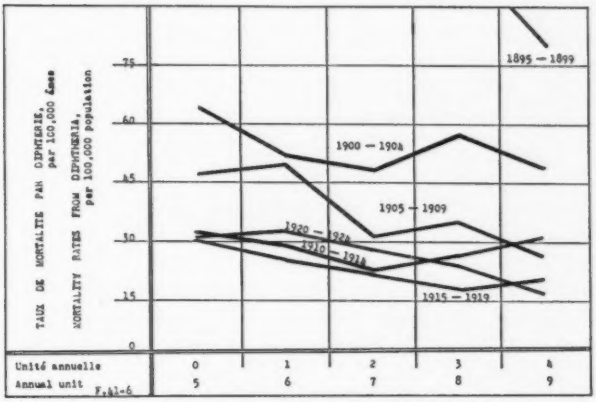

FIGURE II

Province of Quebec: Mortality from Diphtheria by quinquennial periods

Though the previous five-year period shows an increase in mortality, the period 1925-1929 marks a notable decrease, with however a peak in mortality in 1927 (figure III).

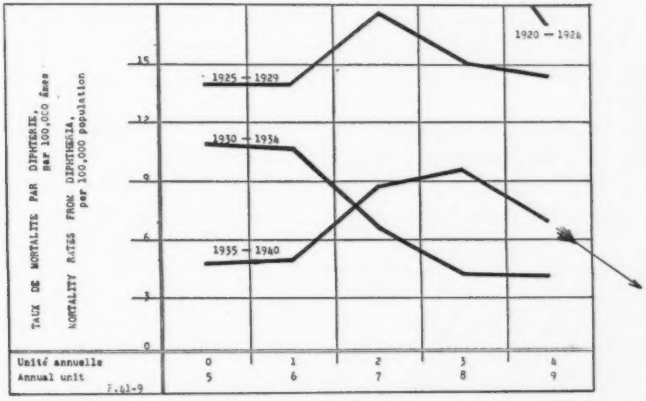

FIGURE III

Province of Quebec: Mortality from Diphtheria by quinquennial periods

For the period 1930-1934, we have a marked decrease, especially in the three last years of the period; this decrease corresponds to the provincial campaign of immunization against diphtheria, a campaign which was conducted at the same time in the city of Montreal. This graph shows a notable achievement in the fight against diphtheria.

The wonderful decrease of the previous period could not however be maintained in the six years 1935-1940. The mortality rates for the years 1933-34-35-36 are practically stabilized. This cessation of the decreasing mortality rate

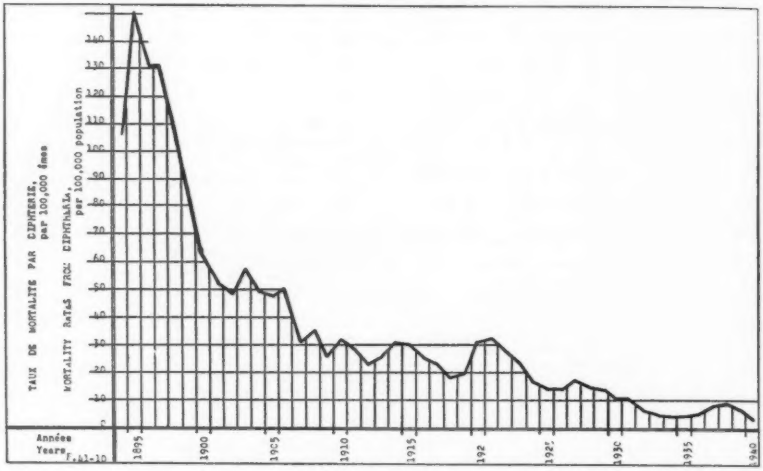

FIGURE IV

Province of Quebec: Mortality from Diphtheria from 1894 to 1940, inclusively

was a premonition of the increase experienced in the three following years 1937-38-39. The rate goes up to a higher level on account of epidemic diphtheria in Quebec City and the neighbouring counties. As soon as the city of Quebec could immunize a sufficient number of children, we have seen the rate coming down.

Figure IV gives the distribution of the mortality from diphtheria from the year 1894 to 1940 inclusive. This graph shows the spectacular fall in the rate from the end of the last century to the present day. The medical profes-

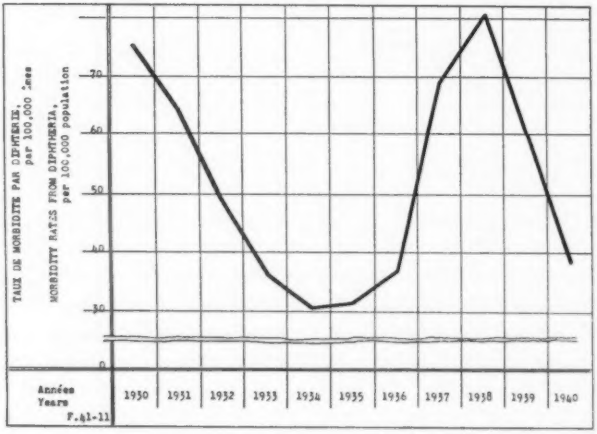

FIGURE V

Province of Quebec: Morbidity Rates from Diphtheria per 100,000 population

sion was armed with a new weapon; of course the doctors had to learn how to use it. But we know that they did do so when the rate dropped from 150 in 1895 to 47 in 1905. About that time the use of serum for passive immunization of the contacts came into more general use and a new drop to 30 in 1915 is registered. Then the decrease goes on with an annual peak in the curve here and there, but the trend is toward a lower mortality.

In 1930 active immunization by toxoid was initiated as a public health measure: we have not the time to study this important piece of work.

Has the morbidity rate followed the same downward curve? In figure V an eleven-year period (1930-1940) is studied because this period covers the time since immunization by means of toxoid was begun in the province.

Figure V drawn from table II shows a decline from a high morbidity at the

TABLE II

DIPHTHERIA MORBIDITY RATE PER 100,000 POPULATION FROM 1930-1940 (INCLUSIVE)

Year	No. of cases	Rate per 100,000
1930	2,064	75.5
1931	1,861	64.7
1932	1,436	49.1
1933	1,076	36.1
1934	925	30.6
1935	980	31.9
1936	1,167	37.5
1937	2,179	69.4
1938	2,574	80.8
1939	1,954	60.5
1940	1,260	38.5

beginning of the period, 75.5, to a level in the thirties for a few years, followed by a sharp rise to a peak of 80.8, to come back in 1940 to 38.5.

Morbidity follows rather closely the mortality curve for this period, though it has not been infrequently observed that the use of serum has but little effect on morbidity.

Over a quarter of a million children have been actively immunized in this province; we may have had a few scares but no serious incidents. A lesson must however be drawn from our experiment of toxoid, which is in accordance with the statement of Dr. D. T. Fraser* that a reasonable immunity will protect children for about five years. It is then opportune to give the children a reinforcing dose one year after immunization or when they start going to school if they have been immunized in their first years.

SUMMARY

1. Very high rates of mortality were prevalent before the period which is the object of this study.

*Canad. Pub. Health J., 1939, **30**: 469.

2. A mortality rate of 150 per 100,000 population was registered in 1895, and of 3.6 in 1940 (provisional figure).

3. The use of serum decreased mortality in a marked manner.

4. Passive immunity conferred on contacts through the administration of antitoxin brought a new decline in mortality rates.

5. Toxoid has proved to be a valuable weapon in the fight against diphtheria.

6. A protective immunity will last for about five years and a new stimulus must then be added through the reinforcing dose.

Diphtheria has not yet been completely stamped out, but it may be said that the disease is under epidemiological control.

An Outbreak of Paratyphoid Fever in the City of North Battleford, Saskatchewan

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BEGINNING the latter part of July 1941 a rather severe epidemic of typhoid and paratyphoid occurred in the City of North Battleford. Before the epidemic was brought under control it had spread to residents of the tributary district. A total of 65 cases and 3 deaths were reported to the Department. In addition, unconfirmed cases exhibiting clinical manifestations of the disease were numerous. This report is based upon investigations made by Dr. F. C. Middleton, D.P.H., Director of the Division of Communicable Disease, and Mr. J. G. Schaeffer, B.Sc., Director of the Division of Sanitation, of this Department.

The City of North Battleford has a population of approximately 5,500. It is situated in the north-west portion of the Province of Saskatchewan on the north branch of the Saskatchewan river. Directly across the river, on the south bank, is the old town of Battleford, an outpost in the early history of the Province. Both municipalities have waterworks and sewerage facilities. The water supply for North Battleford is obtained from wells, located near the river, upstream from the city. The water is not treated except for intermittent applications of hypo-chlorite. The sewage treatment plant is of the activated sludge type. Neither raw nor treated sewage is chlorinated. The effluent is discharged into an open ditch and flows to the Saskatchewan river about a mile distant and well below the source of the city's water supply.

Milk regulations in effect at North Battleford provide for compulsory pasteurization. The town of Battleford permits the sale of raw milk, but the bulk of the supply is pasteurized and is obtained from North Battleford plants.

The first illness of which there is a record occurred in a waitress, age 20, employed in a local café. This patient first felt indisposed on July 14th, but continued at her employment until July 30th. During this period, she experienced headaches and a feeling of lassitude, but did not consider her illness of sufficient magnitude to warrant quitting work. On July 30th, however, she could no longer continue and sought medical attention. She was removed to hospital on August 1st when her illness was diagnosed as typhoid. Widal tests performed at the Saskatchewan University laboratories disclosed typical paratyphoid B reactions.

The history of case no. 1 in addition to that recounted above was to the effect that she had attended numerous dances both in the city and at summer resorts in the surrounding district during the period of her indisposition. She consumed little or no food at these functions, preferring late evening lunches at city cafés. All her regular meals were taken at the restaurant where she was employed. This restaurant obtained the bulk of its vegetables from a Chinese truck farm, reference to which will be made in succeeding paragraphs.

Further investigation revealed the interesting fact that the mother of case no. 1 gave a history of illness prior to July 14th. This illness was of a mild nature and extended from the latter part of June to the middle of July. No medical attendance was sought, but the symptoms were said to be headache, nausea, a slight rise in temperature, without diarrhoea or constipation. When the daughter's illness was diagnosed as typhoid the mother was vaccinated, consequently a subsequent Widal was of no value. However, stool examinations were negative.

The next early cases occurred in three sisters in a family of seven. All three had a severe attack of diarrhoea on July 30th. The eldest was hospitalized on August 6th, and on admittance the symptoms were weakness, listlessness, insomnia, headache, and diarrhoea. Temperature was 99°F., pulse 84, and respiration 20. This patient was very ill and had a positive Widal for paratyphoid B. The other two sisters were treated at home, and no other member of the family contracted the disease.

The history of the sisters was rather baffling in that it did not follow the pattern of subsequent cases and there appeared to be no connection with them. The two eldest girls, aged 27 and 21, attended a picnic at a local summer resort on July 27th. They took their own lunches, including bologna sandwiches, with them, and drank only bottled carbonated beverages. Upon their return a younger sister, age 14, partook of some sandwiches remaining from the picnic. She, with the two eldest sisters, became ill, and they were the only members of the family so affected. This family had no contact with case no. 1 and lived in a different section of the city. Neither did there appear to be contact with others involved in the epidemic, nor with public eating-establishments in the city. Under the circumstances it is possible the original illness was due to a meat poisoning enteritis.

No additional cases were reported until August 9th. From that date there was one or more almost daily, culminating in a peak on the last two days of August and the first day of September, when there were four or more cases daily. After September 1st a gradual decrease took place, but there were residual cases until well on in the month. With few exceptions the laboratory tests gave positive paratyphoid B agglutinations. Some reactions were typically typhoid, especially during the latter part of the epidemic.

The local health authorities requested the assistance of the Department on oratory tests gave positive paratyphoid B agglutinations. Some reactions were typically typhoid, especially during the latter part of the epidemic.

The Department conducted a thorough investigation, which at that late date was necessarily somewhat incomplete and inconclusive in some essential details. All pertinent data were collected and assembled and within a short time the following facts were established:

(1) There were then 35 confirmed cases, one fatal, and a large number of cases with clinical symptoms of the disease.

(2) The causative organism was found to be the paratyphoid bacillus, type B.

(3) The majority of the patients were city residents, but there were also country patients, all hospitalized in the city.

(4) With one or two exceptions all patients were adults. Males and females were equally affected.

(5) Neither housewives nor infants were reported ill.

(6) With the exception of members of the family involving three sisters, all city patients were employed in down town business establishments.

(7) The residences of city patients were distributed over all the city.

(8) With few exceptions, all patients including those from country points had a history of eating one or more meals at city restaurants within the incubation period of the disease.

(9) There was only one case in the town of Battleford and this patient up to the time of illness was employed in North Battleford and ate at city restaurants.

(10) Milk and water examinations were negative, and routine examinations prior to the outbreak were also negative.

(11) The inspection of milk, water, and beverage plants disclosed nothing to indicate infection from those sources. Bottled beverages when examined bacterially were found negative and of good quality.

(12) Several public eating establishments obtained fresh vegetables from a local truck farm, operated by Chinese, and many patients had consumed salads at these establishments prior to their illness.

From the data obtained, it was evident that neither the milk nor the water supply was a factor in the spread of the disease. However, all milk handlers were medically examined for carriers, with negative results. The evidence pointed to food served at one or more city restaurants. No carriers were found among restaurant employees, but in addition to case no. 1, a waitress and a cook were stricken. The cook was employed at an hotel, which, although not supplying meals to the public, obtained vegetables from the Chinese truck farm. The investigation then led to the latter establishment.

The truck farm was on property adjacent to the city's sewage treatment plant, but at a lower elevation and between the plant and the Saskatchewan river. The sewage effluent was discharged into an open ditch leading to the river about a mile distant. The ditch followed along the westerly border of the truck farm, and it was the habit of the operators to divert all or a portion of the sewage flow for the irrigation of vegetables. It was also suspected that this water was used for washing vegetables prior to sale, there being no other water on the property. Needless to say, the sale of products from this farm was immediately curtailed, and steps were taken to prevent the recurrence of a similar situation.

Although the original source of the infection was not definitely determined, it is reasonably supposed that the disease was disseminated through the consumption of vegetables which had been irrigated with sewage effluent. As the outbreak occurred during the summer holiday season, numerous transients were common in the city at that time. It is possible that one or more were carriers. Another supposition, and a logical one, arises from the fact that two Indians from a Reserve thirty miles south of Battleford were hospitalized at North Battleford in the early part of July. Their illness was diagnosed as typhoid, and it is said that the stools from these patients were not disinfected before being discharged into the sewerage system.

Lymphocytic Choriomeningitis*

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DURING the 1933 outbreak of encephalitis in St. Louis a coloured woman became ill and died of a neurotropic infection thought at the time to be St. Louis virus disease. Inoculations into monkeys of tissue taken from this woman resulted in capturing a virus which was found to differ from St. Louis virus. It infected guinea pigs and the Cebrus monkey, was present in the blood and spinal fluid of infected monkeys during the febrile period, and failed to cause infection when instilled into the nose. Finally serological methods demonstrated no relationship between the two viruses. The discoverers of this new virus, Armstrong and Lillie (1), named it lymphocytic choriomeningitis because of the pathological picture produced in experimental animals.

In 1935 Traub (2) demonstrated the presence of a virus in members of a colony of white mice. This virus apparently caused no inconvenience to these animals until activated by the inoculation of other substances. For instance, sterile broth inoculated intracranially would activate the virus, resulting in the mice becoming infected with a fatal encephalitis. Virus thus activated could be transferred to guinea pigs and carried in serial order in these animals. Cross neutralization experiments showed that this mouse virus was identical with the virus found by Armstrong and Lillie.

This finding led some to question the pathogenicity of the virus for man. They believed that in the case studied by Armstrong and Lillie the virus was contained latently in the brain of the experimental monkey and activated by the inoculation of tissue from the coloured woman. This matter was settled finally in 1936 when Rivers and Scott (3) obtained virus from the spinal fluid of two persons affected with so-called sterile meningitis. Neutralization experiments demonstrated that the virus isolated by them was identical with that which had been isolated formerly by Armstrong and Lillie and also by Traub.

In 1936 Bengtson and Wooley (4) propagated lymphocytic choriomeningitis virus on the developing chick embryo. The following year Wooley, Stimpert, Kessel and Armstrong (5) surveyed by the neutralization method 680 sera taken from various States of the Union and Hawaii. These sera, it should be pointed out, had been collected for ordinary routine laboratory work and should therefore give a fair determination of the instance of infection in the general population. Of the 680 samples, 123 or 18 per cent were found to possess neutralizing antibodies for lymphocytic choriomeningitis virus. As far as could be determined

*Presented at the tenth annual Christmas meeting of the Laboratory Section, Canadian Public Health Association, Toronto, December 17 and 18, 1941.

the persons who possessed antibodies had never shown clinical encephalitis. This would point to subclinical infection being common. In 1940, 303 grey mice captured in 76 different homes were examined by Armstrong, Wallace and Ross (6) and of these 64 were found to be carriers of lymphocytic choriomeningitis virus. They originated in 34 different homes. The authors concluded that grey mice were probably the reservoirs of choriomeningitis virus from which man derives his infection.

The mortality of lymphocytic choriomeningitis in man has been exceedingly low and consequently the pathology has in a large measure remained unstudied. In the first St. Louis case the nature of the virus was not discovered until a considerable time had elapsed following the coloured woman's death. Therefore pathological studies were confined to experimental animals. A further attempt to study the pathology was made by Lillie in 1936 (7) when the histopathology of the brain and cords of infected monkeys was investigated. In 1937 Machella, Weinberger and Lippincott (8) made a histological investigation of the brain of a patient who had died from what was believed to be lymphocytic choriomeningitis. In the same year Viets and Warren (9) conducted a histopathological study of a patient who died from acute lymphocytic choriomeningitis. In 1940 Silcott and Neubuerger (10) also conducted pathological examinations on brain tissues of three individuals who were thought to have succumbed to lymphocytic choriomeningitis. It is thus apparent that post-mortem examinations have been conducted upon very few persons in whom the virus of lymphocytic choriomeningitis has been proved present.

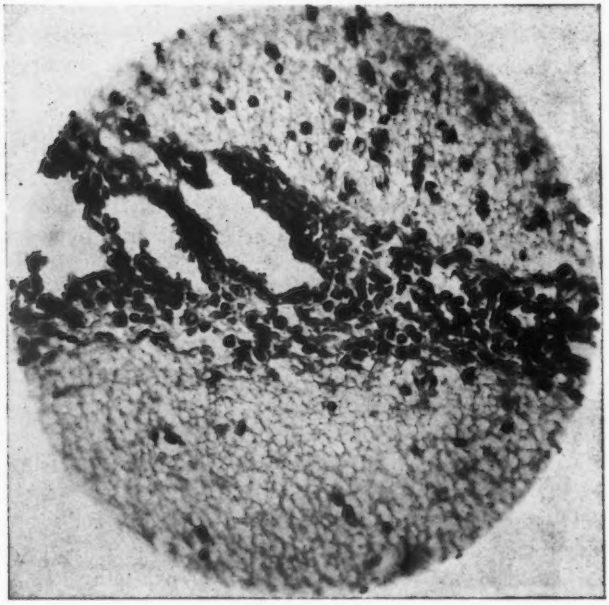
Due to the virus being apparently widespread and to the possibility that man is more frequently infected than is at present realized, it was thought that a case in which death occurred and in which the nature of the virus and the histological picture were determined might be of interest.

A twelve-year-old child had previously appeared healthy until one week before death, at which time an indefinite febrile illness developed which was followed four days later by neck rigidity. The child was apparently only moderately ill and spinal puncture showed a moderate amount of cerebrospinal fluid with an increased cell count having a preponderance of lymphocytes; chlorides and sugars were slightly decreased. On the seventh day the child suddenly became extremely ill and a few hours later died.

PATHOLOGICAL EXAMINATION

On autopsy, a caseous tuberculous process of the right lung and peribronchial and peritracheal lymph nodes was found but there was no evidence of miliary dissemination. When the brain was opened it was seen that the dura was unusually tense with a marked degree of flattening of the cerebral convolutions. The cerebrospinal fluid had a slightly turbid appearance. On removing the brain it was apparent that the cerebellar hemispheres had been driven into the foramen magnum, forming a "cerebellar pressure cone." The brain weighed 1,400 gm. and it and the spinal cord were superficially congested although the normal architectural markings were still intact and no gross lesions were demonstrated.

Sections were made from representative areas of the cord and brain. These were stained with hemotoxylin eosin, cresyl violet, and Mallory's phospho-tungstic acid. These sections showed rather profound changes to be present throughout the meninges in all sections examined, lesser changes being present in the nervous tissue itself. The arachnoid was thickened to an extreme degree as a result of oedema and was heavily infiltrated with large numbers of chronic inflammatory



HIGH POWER OF SECTION FROM LEFT CORTEX SHOWING PREDOMINANCE OF LYMPHOCYTES INFILTRATING A VIRCHOW-ROBIN SPACE.

cells, principally lymphocytes though in some areas macrophages predominated. A small number of plasma cells were also present but polymorphonuclear cells were absent.

A special feature of this reaction was the involvement of vessel walls, more especially the veins, by a similar type of inflammatory infiltration. This was present throughout the entire thickness of the wall and was associated with some hyperplasia of the lining endothelium though all lumena were patent. The inflammatory exudate extended into the substance of the brain and cord following the course of the Virchow-Robin spaces. There was, however, relatively little involvement of the nervous tissue itself by this infiltration. Sections of the cord showed in addition many of the ganglion cells to be considerably swollen, while the nuclei were broken up into numerous minute, deeply stained globular masses which tended to be concentrated about the periphery of the cells, resembling in some respects inclusion bodies but differing from them in staining reaction. In

the sections stained with phospho-tungstic these masses assumed a purplish-blue colour which contrasted sharply with the reddish-brown of the cell body. These changes were less marked in the sections of the cortex and the brain, which showed mainly an interstitial oedema, especially of the superficial gray matter.

At a later time sections were made of guinea-pig brains infected by the causative virus and also guinea-pig brains infected with a stock strain of

SECTION OF SPINAL CORD SHOWING INVOLVEMENT OF VESSEL WALLS BY THE INFLAMMATORY REACTION.

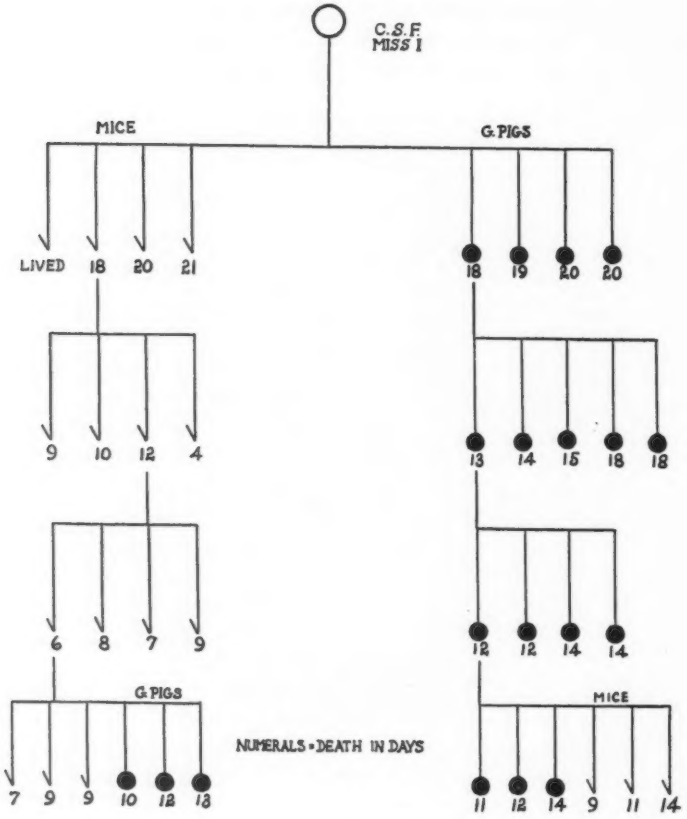
lymphocytic choriomeningitis virus. The findings in these guinea pigs were essentially similar to the findings already recorded except perhaps in degree. For instance, the vein walls were not as aggressively infiltrated with mono-nuclears as in the patient.

BACTERIOLOGICAL EXAMINATION

At the time of autopsy the cerebrospinal fluid was collected, centrifuged, and examined microscopically for microorganisms. None were found. Later the precipitate was inoculated into guinea pigs which were kept for two months and during this time failed to develop bacterial infection. Cultures planted on various media, such as blood agar, ascites agar and Dorset's egg, remained sterile.

Four guinea pigs and four mice were inoculated intracerebrally with cerebrospinal fluid. The guinea pigs died on the 18th, 19th and 20th day, and three mice died on the 18th, 20th and 21st days respectively. One mouse survived. From

a representative of each group the virus was carried in serial order as shown in the accompanying diagram.



Due to the incubation period being rather long in the first passage it was assumed that the virus was other than lymphocytic choriomeningitis. In later passages the incubation period became shorter and conformed more to that of type strains.

NEUTRALIZATION EXPERIMENTS

Two groups of 12 guinea pigs each were given four injections at six-day intervals of 2 cc. of vaccine. One group received inactivated virus contained in the formalized brain of guinea pigs infected with the strain recently isolated. The other group received a similar vaccine containing a stock strain of lymphocytic choriomeningitis. Six days later a small dose of the corresponding live virus was administered subcutaneously. Of the group immunized with the virus under study, all developed infection as evidenced by clinical symptoms, and four

recovered. Of the group receiving stock virus, seven died and three recovered. Apparently the formalized brain stimulated but slight resistance.

Surviving animals from each group were bled and their sera used for cross neutralization. Sera from each group neutralized both viruses. After bleeding, the surviving animals were cross-challenged with each virus and found resistant. Subsequently all were challenged with the Western strain of encephalomyelitis, to which they succumbed. Therefore the virus isolated was lymphocytic choriomeningitis.

SUMMARY

(1) A strain of lymphocytic choriomeningitis was isolated from a patient who died from a neurotropic infection.

(2) An account of the histopathology is given.

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Some Aspects of the Control and Prevention of the Venereal Diseases*

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AS long as society believed that nothing could be done to prevent or cure venereal diseases, a policy of silence and laissez-faire seemed justifiable to a certain degree. Today public opinion has changed. Our knowledge of these diseases and their mode of transmission, combined with the powerful therapeutic arsenal available to combat them, are showing us clear evidence of possible prevention and control, and do not permit any longer of this policy of concealment but rather incite us to come out in the open and attack the problem directly.

Preventive measures against any contagious disease present two distinct aspects in their application: on the one hand, the adoption of means to avoid the disease and, on the other, the treatment of those infected in order to render them non-infectious. In the first place, a knowledge of the disease itself, of its contagion, its general and individual prophylaxis, is necessary; in the second, proper and adequate treatment is essential. This procedure, which is applicable to any contagious disease, will not differ in the case of venereal diseases, which are also known to be transmissable, except for the consideration that here active or passive immunization cannot be resorted to, as a means of prevention, as is the case with diphtheria, scarlet fever, or typhoid. This fact naturally handicaps our facilities of prevention and control.

Among venereal diseases, gonorrhoea and syphilis are considered the most important. Their control should be the main concern of the health officer. The discovery of sulphanilamides and their therapeutic achievements in the treatment of gonorrhoea have, however, cut short its duration and to an extent its dangers of contagion. This is no reason for ignoring it completely, but the health officer will lay every stress on the control of syphilis. Moreover, the general control measures used for these diseases do not differ so greatly, and their application is much the same. However, certain aspects of the question of the prevention of syphilis, for example the continuation of a long and sometimes distressing treatment, the question of heredity, the nature of the disease itself, the confidential aspect of reports, etc., complicate the problem to the point where a very special procedure is necessary. For these reasons the present communication will be limited to the study of the problem of syphilis prevention and the solution that in our opinion seems most logical.

The Problem of Syphilis

It is obvious that this presentation is not meant to include an account of the

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etiology, evolution or details of the treatment of syphilis. Let us recall, however, that the disease, when left to itself, presents serious sequelae. Lesions in skin and mucous membranes, in the bones, and in the viscera are frequent manifestations of the disease. The disease progresses insidiously, and is responsible for such conditions as aoritis with subsequent aneurism or angina pectoris, arteritis with hemiplegia, myelitis with subsequent paralysis, pulmonary infiltrations that may lead to phthisis, stricture of the rectum with intestinal occlusion, and other visceral changes.

These lesions, although serious, can still be effectively treated if they are recognized early, but what of the late manifestations of syphilis—general paralysis of the insane, locomotor ataxia, or associated tabo-paresis? These are practically incurable and the only hope is early diagnosis. What a number of individuals are thus stricken by these diseases! It is well known that syphilis is one of the most common factors in such conditions as arteriosclerosis, atheroma, myocarditis, nephritis, and Raynaud's disease, the etiology of which is often missed if syphilis is not suspected. These manifestations of syphilis after midlife constitute the most frequent causes of morbidity and mortality. Syphilitic infection may also prepare the ground for cancer, since syphilis is productive of leucoplakia and other conditions which may be considered as precancerous. Lastly, syphilis not only strikes the individual but may be transmitted to the wife or husband and to the children. Its discovery in such circumstances too often leads to irremediable disruption of the family.

Syphilis is, for all these reasons, a danger to the individual, to the family and to society, that we must by all means face at these different angles if it is to be eliminated.

Before entering upon a study of the method of preventing this disease, it would seem logical here to point out some of the facts relating to its epidemiology and mode of transmission. The following definition given by Professor Marin summarizes the knowledge that is necessary in the control of the disease: "Syphilis is a contagious disease capable of attacking any tissue of the body, caused by the Treponema pallidum of Schaudinn and Hoffman and transmitted directly or indirectly, venereally, or accidentally."

EPIDEMIOLOGY OF SYPHILIS

Morbidity

Statistics prepared by Doctor J. Archambault, Director of the Venereal Diseases Division of the Provincial Ministry of Health, reveal the fact that there are one hundred and twenty-five thousand syphilitics in the Province of Quebec. He arrived at these figures by ascribing a rate of morbidity of 6 per cent to the urban population and of 3 per thousand to the rural. We believe these figures to be very conservative, especially in the case of our rural population. We rather think that the rate of three per thousand is too low compared with that of the cities when we consider how easy it is to-day, with our modern transportation facilities, for our rural people to come in contact with foci of infection generally located in cities. The same facilities exist for the same foci of infection to travel from the larger centres to the rural districts, and we know that they take full advantage of this situation to disseminate the syphilis virus.

In our Province, and elsewhere as well, where a routine Wassermann was done in hospitals on all patients admitted, to ascertain the incidence of syphilis, various rates have been obtained, some as high as 26 per cent. According to Dr. Thomas F. Parran, Surgeon General of the United States Public Health Service, 10 to 12 per cent of all deaths from heart disease are reportable to syphilis. Neurosyphilis is responsible for 10 per cent of all cases of insanity. Sixty thousand syphilitic children are born annually in the United States; 25,000 die before birth. Approximately one million of the potential mothers have syphilis. These figures need not surprise us when we learn that only 10 per cent of all syphilitics are receiving adequate treatment; the others, of whom a large number are contagious, continue the propagation of the disease. It is this last consideration that renders the problem so acute and so hard of solution.

Sources of Contagion

The main source of contagion of syphilis is, without the least doubt, prostitution, commercialized or clandestine; and all legislation enacted in this Province as well as elsewhere to prevent venereal diseases, and syphilis in particular, is designed to bring under control those responsible for this mode of infection. We must remember, however, that if we admit that 50 per cent of all syphilis is innocently contracted (conjugal, hereditary, and accidental syphilis), the solution of the problem does not lie entirely with the methods generally used to fight prostitution. Even in this last category of syphilis, if we take the trouble to look for it, we will find prostitution as the primary cause, or at least the adjuvant cause, of the syphilitic infection. It is therefore important, when speaking of control, to stress the point that prostitution must be abolished if the problem is to be solved.

Infection

Concerning the mode of transmission, it must be remembered that the spirochaete lives on moist surfaces only, that it can be transmitted directly by venereal contact from one person who is infected to another who is not, or indirectly through the medium of articles or secretions infected by syphilitics sometimes without laceration of tissues at the point of inoculation. The germ can also elect as a port of entry any point on the mucous membranes or teguments and from these invade all tissues of the body, this invasion occurring, according to Stokes, in the first or second hour following inoculation.

Infectivity

All syphilologists agree that the infectious phase of syphilis abandoned to itself—that is, not treated or insufficiently treated—is from the appearance of the chancre to the fifth year of its evolution, the first two years being the worst offenders. Hereditary infection is the great exception to this rule. After the fifth year, dangers of infection would be negligible or almost so. This last statement is, however, subject to certain reservations. In fact, it is admitted that 2 per cent of syphilis of more than four years' duration may be contagious.

In the American Journal of Syphilis for November 1939, Dr. R. A. Vonderlehr, of the United States Public Health Service, wrote as follows:

"Practical experience has shown that most people who have transmitted syphilis to others have been infected with the disease for a period of less than two years, and in the vast majority of such cases the lesions of early syphilis involving the mucous membranes and skin are to be found. It is common, however, to find people with syphilis who name as contacts others who have latent syphilis. This brings up the question as to whether the seminal fluid or utero vaginal secretion of patients with latent syphilis harbour the spirochaeta pallida for years after the cutaneous and mucosal manifestations of the acute disease disappear. Experimental work, up to the present time, has not given this answer."

From what has just been said it is evident that early syphilis and syphilis of less than five years' duration is responsible for the dissemination of infection and that late syphilis is much less infective and consequently of minor interest to the public health officer.

Prevention and Control

The methods used in the prevention and control of syphilis relate to the efforts to find cases, trace the sources of infection, and hold all cases for treatment until non-infectious. Those engaged in this work must show special concern for congenital syphilis and remember at all times that the syphilitic patient is a fellow human being.

Among those who participate in the struggle against syphilis, we have on one side those who are infected and need help and, on the other, those who have the necessary knowledge and experience and are anxious to render assistance. The outlook would be much brighter if there were mutual understanding and confidence between the patient and those who are trying to help him.

In order to reach this objective, the following methods are proposed:

1. Education of the public, the patient, and the medical practitioner.
2. Finding of cases and sources of infection.
3. Early diagnosis followed by early and continuous treatment.
4. Ways and means by which infected patients are brought under treatment.

EDUCATION

Education of the Public

Society is not sympathetic to syphilitics. The patients find themselves in a class by themselves, resenting deeply the stigma generally attached by the public at large to venereal diseases. This attitude has always created a conflict between public welfare and the individual will of patients, who otherwise would have looked for treatment sooner and ceased to be infectious. If we are to win the battle against syphilis, the public must get rid of this absurd idea that the disease is a shameful one; the public must also understand that syphilis must be dealt with epidemiologically like any other serious infectious disease. Has not the public the same right to protection against syphilis as against any other serious

disease? It is not only the right of the individual to have this protection, it is the duty of the State to provide it. If nothing has been done so far, it is because of existing prejudices that must go if the danger of syphilis is to be avoided. In order to obtain this result, the public must be in possession of the real facts of the disease and the means to prevent it.

As already mentioned, about 50 per cent of all syphilis is innocently contracted. We cannot reasonably admit that syphilis is a just punishment for a child or a husband or wife, or a physician whose role is to alleviate all ailments, including syphilis. No, syphilis is not a punishment for a crime; rather is it due to our ignorance and negligence; and a public well informed of these facts will soon change its attitude towards the disease. Public conferences, films, literature, and private interviews are all good methods of accomplishing this purpose.

The Patient

When the patient consults his physician and is told that he has syphilis and is informed of the serious consequences of this infection, one might think that he would seek treatment immediately. Instead, the patient is overcome with a feeling of deep depression, if indeed he does not suffer a nervous breakdown. Later he realizes the situation and promises to co-operate with his physician, stating that he will follow treatment, will not expose anyone to infection, and, in short, will be a model patient. But as the treatment proceeds and the evident lesions disappear, he will fail to continue treatment, believing himself cured, and thus will continue to spread the infection.

This is not exactly a good method of controlling syphilis. Either this patient did not understand his instructions or he is wilfully negligent. If he is wilfully negligent, he should be dealt with according to the law. On the other hand, if he forgot about the instructions which he received, he will have to be traced back and brought under treatment. An appeal to his conscience is necessary so that he may fully understand the importance, for himself and others, of carrying out the instructions. He should know of the nature of the disease and of the absolute necessity of following treatment continuously for months and sometimes for years. He must be informed that a negative blood test or the disappearance of lesions is no indication to cease treatment. His physician must tell him that the infective agent will persist in tissues a long time after his blood test has been found negative. Further, he must receive full information concerning the danger of his spreading the disease and he must be given detailed instructions suitable for his age and status. The instructions should include general hygiene, as well as the proper care of the mouth, teeth, and genitals. Finally, without too much emphasis on it, he should be reminded of the existence of legislation against venereal diseases for the protection of the public.

It is a very serious error, however, to think that fear of the law is the main factor in the control and prevention of venereal diseases and is the only effective method of curbing any crime. One must look for considerations of a higher level: the ideal that our young men and women must be guided by moral principles in sexual matters. This moral teaching should be given to them first by

the parents and then by educators, both lay and religious, supplemented by adequate education in sexual hygiene.

As for the patients who wilfully neglect treatment, they must be dealt with forcibly. They belong to the category of vicious persons, vagabonds and prostitutes, and are amenable only to the law. The law provides for such cases and they must be isolated.

The Medical Practitioner

If syphilis is the problem of the health officer, the philanthropist, and the statesman, it is more so the problem of the medical practitioner. The role of the physician in syphilis control is to safeguard the healthy individuals, the mother and her unborn child, as well as every other child and adult. One important objective is to reduce the economic loss caused by the premature death of those who suffer syphilitic infection, and to reduce the amount of sickness and invalidism and the cost of support of families rendered indigent through the ravages of syphilis.

The physician must possess a wide knowledge of syphilis, including its epidemiology. He must be able to make an early diagnosis. He must know the most modern methods of treatment and be familiar with the different modes of transmission of the disease, and be in a position to discuss the social and family problems raised by syphilis. He should not hesitate to consult a specialist in the diagnosis or treatment of difficult cases. Finally, the practitioner should be familiar with all legislation relating to venereal diseases and with every method of prevention in order that he may render the most effective service in the control of these diseases.

Finding of Cases and Source of Infection

To find cases of syphilis, various methods have been tried with more or less success. In different States of the U.S.A. travelling clinics have been employed. Thousands of persons have presented themselves for a blood test. To make the public conscious of the problem, publicity methods of various kinds have been used. In Chicago, for instance, parades were organized in which participants carried banners announcing venereal clinics. Other banners described the ravages of syphilis and others advised a blood test.

As for us, we believe that education, which has already been discussed, and the procedures which we have followed in hospitals and in industry are satisfactory and effective.

Hospitals

In every hospital a routine serological examination of the blood should be performed on every patient admitted. This procedure should apply in every sanatorium, mental hospital, or orphanage. In industry, routine serological examinations should be performed on every worker at the time of his employment and such an examination should be repeated periodically. This method is not commendable if it is used as a criterion in the engaging or discharging of a worker. If so used, it would miss its purpose, which is the finding of cases and

their treatment until cured. If industries studied the problem more closely, they would soon realize that increased production and cheaper production, together with a substantial drop in the cost of workmen's compensation, follows the giving of proper attention to the health of the workers.

The Medical Profession

The part the medical profession must take in the solution of the problem of syphilis prevention has already been outlined. We can depend on the generous co-operation of the profession. The family physician in many instances is the only one who can give us information as to the transmission of the disease and the source of infection. His contribution would be much greater if he could persuade every patient, particularly every pregnant woman, under his care, to have a serological blood examination.

Legislation

Effective legislation tactfully used and supported by competent social service is of the greatest importance. I will not discuss the subject of legislation as it is the subject of a separate paper by one of my colleagues.

Social Service

Through social service, contacts are traced and sources of infection are found, thus making it possible to bring such infected persons under treatment. It is not necessary to emphasize the importance of this service. It must be carried out by competent personnel composed of graduate nurses or other qualified persons who have received special training. The trained social worker understands the attitude of the patient towards his disease and the social factors that may interfere with his treatment. It is therefore obvious that she will not use general methods applicable to all patients, but will have to consider each patient as presenting a special problem, the solution of which will depend on her ability and initiative. Through the trained social worker the difficulties and objections are removed so that the patient receives the examination and continues treatment. In the discharging of her duties the social worker should always have in mind the respect of the individual and the sanctity of the home and family, convinced as she should be that every patient's greatest desire is to become a healthy and respectable citizen. She must therefore possess culture, tact, and a wide social education as well as a knowledge of psychology. She should show enthusiasm for her work and a constant desire to learn. She should possess a basic knowledge of the etiology and treatment of syphilis and its relation to other diseases. Lastly, her personality, her education, and her performance should be such that she should win the respect and co-operation of the different social groups that may be of help in her work.

Early Diagnosis, Early and Continuous Treatment

If case finding is of great importance in a program of prevention, it will be realized also that providing facilities for treatment of patients is just as important. Among persons for whom treatment is imperative, those whose infec-

tion is recent, and pregnant women come first. Such patients are of prime interest to the health officer. They fall into two categories, indigents and non-indigents. For all persons, however, diagnosis must be early and the treatment must be commenced as soon as possible and be continued. Practical experience reveals that the future of a syphilitic patient depends on the promptness and intensity of the treatment. The treatment of syphilis in the chancre stage is called "first-aid medicine". To warrant that term, treatment must be started fifteen days before the onset of the serological period. A syphilitic treated at this stage has almost a 100 per cent chance of being cured. The physician is the one responsible for early diagnosis and for adequate treatment, and, in the vast majority of cases, he is the one who can give the best information as to the sources of infection.

The diagnosis of syphilis is not always an easy matter when one knows how often syphilis simulates other diseases and how often it exists without clinical symptoms. This explains our insistence on the use of the laboratory as an aid in diagnosis. It is common knowledge that positive serological findings of the blood or cerebro-spinal fluid often constitute the only evidence of the disease. Statistics of the Johns Hopkins Hospital, Baltimore, show that one-third of male syphilitic patients, and almost one-half of female patients, are clinically asymptomatic. In the Mayo Clinic it is reported that three out of five patients do not know that they are infected. Our own data indicate that positive blood findings are recorded in 90 per cent of recent asymptomatic patients and in 80 per cent of all latent syphilis.

During pregnancy, nine times out of ten the syphilitic woman will show no symptoms except positive blood findings; likewise, nine times out of ten, treatment instituted before the fifth month will result in the birth of a healthy child.

From all these observations it is obvious that the clinician, clever as he may be as a diagnostician, should always take advantage of serological tests. In the pre-serological phase of the disease he should remember that the dark-field examination is the sine qua non in early diagnosis. In suspected cases of neuro-syphilis lumbar puncture must be done systematically. Examinations of the cerebrospinal fluid reveal positive reactions in 15 per cent of latent syphilis.

We repeat here that treatment must be early, unremitted and continuous, particularly in recent syphilis. Syphilologists well know the harm done to patients by treatment given too late or at too wide intervals or in too small doses. It is inadequate treatment that is responsible for relapses, permitting of the spread of infection during the secondary period of the disease and also for the serious visceral or nervous complications of late syphilis.

These scientific facts being so well known, it becomes evident that the laboratory and the clinic must help each other for the benefit of the treatment of syphilis and the prevention of its spread. For the indigents we must find and provide facilities for treatment. The financial status of patients cannot and must not be an obstacle in the fight against syphilis. Therefore clinics must be established for such patients and the social service organization must pay particular attention to them because their problems are greater. The physician on whom falls the responsibility for the care of indigent patients in the clinic or in private

practice should receive fair remuneration. Physicians are not exacting as a rule and will never refuse their share of work and sacrifice to help such a good cause. It is only right therefore that physicians should be compensated for their attendance on indigents.

WAYS AND MEANS BY WHICH PATIENTS ARE GENERALLY BROUGHT UNDER TREATMENT

To be successful and effective, the means to bring patients under treatment must be employed in an atmosphere of sympathy, dignity, and firmness. To this point, we have seen that the education of the public, an informed medical profession alert and clinically suspicious of syphilis, the conduct of routine serological tests for all patients admitted to hospital or consulting physicians privately, a routine blood test for every pregnant woman, and newborn child, and the co-operation of industry are helpful factors in finding cases. Once found, the problem is to treat them until they are non-infectious. We believe this phase the most important of our work. As for treatment, we have already indicated what it should be: early, intense, and continuous.

The continuation of treatment presents the greatest difficulty. For that reason a discussion of the procedures taken is presented. In our opinion it is as important to know the character of the patient as it is to know that the patient is suffering from syphilis. This knowledge will permit the attending physician or the social worker the use, in each particular case, of the best method of approach. This being done, the interest of the patient must be maintained at all times through friendship and sympathy or through rendering a minor service or anything which establishes mutual confidence. The social worker must be alert to the reactions of the patient and be able to take advantage of them. We insist on the necessity, at the first interview, of a complete and simple explanation of the disease and its consequences on public health. Efforts should then be made to convince the patient that he must feel it his duty to notify others so as to prevent unnecessary suffering, but the question of contacts should not be discussed at this time. The best policy at this stage is to proceed slowly and prepare the ground for a confession. In view of this, the patient should be congratulated on his good fortune that the disease was discovered in good time to permit of control and cure. This should rouse his sympathy for the other victims who are ignorant of their infection. He will be given to understand that he is not to be blamed for infecting others, not knowing of his infection. He should also be told that for the same reasons he cannot blame those responsible for his infection. A certain sympathy is thus established between the contacts and the infected person. By this time hesitation in giving names has practically vanished. Finally the patient should be convinced that the information which he has given will be kept secret and he should be instructed on the procedure which he should adopt to find his contacts and to bring them for examination and treatment.

In the problem of continuing treatment, the physician and the social worker who persuaded the patient to be treated through winning his confidence will adopt the same procedure in persuading him to continue treatment. In private

practice we do not believe this to be too difficult. It is quite different with clinic patients. Accessibility of the clinic, convenient hours for treatment, and the lay-out of the clinic to assure privacy, are all essential in meeting this problem. The establishment of venereal-disease clinics in hospitals where other clinics are functioning is desirable. This arrangement prevents the identification of patients attending venereal-disease clinics and secures the services of consultants whose assistance is so important in the conduct of treatment. The personnel of the clinic must at all times remember that the clinic is functioning for the welfare of the patient and not for the good of the doctors and nurses. They must realize their responsibility towards the patient and treat each patient accordingly. The clinic is not treating indigents, but syphilis. Overcrowding, a dull needle, a physician who is indifferent, a nurse who is arrogant, are ready excuses for a patient to discontinue treatment. On the other hand, the patient must realize that by coming to the clinic he is not doing the physicians a favour but rather fulfilling a duty which he owes to himself and to the community.

The observance of all the preceding instructions will not stop a certain number of patients from discontinuing treatment. The social service workers must then make every effort to bring such patients back to the clinic. A new interview will be arranged by the social worker with the patient. A letter will be sent or a home visit made to arrange this interview and renewed insistence placed on his return to the clinic. If her efforts are useless, she may enlist the help of the social groups coming in contact with the patient or his family. Finally, if he stubbornly objects to resuming treatment and is infectious, he will be considered a delinquent and the course of the law will be followed and the patient isolated. We strongly believe that such legislation is necessary but it is also our opinion that the preventive methods indicated above and applied with gentleness and tact by competent personnel, will do more than all coercive measures. Only 15 per cent of patients left to themselves will follow the complete course of treatment. If proper methods are used, 80 per cent will complete their treatment.

In conclusion, it will appear that with such weapons as we possess against syphilis that I would speak of as being "specific", with a well-informed public, a well-trained social service and, lastly, sound social legislation, the problem of syphilis should not exist. The application of measures such as those I have outlined have produced marvellous results in the Scandinavian countries. Why should the same results not be obtained in Quebec or in any one of our Provinces? The present war, like the war of 1914-18, has again opened our eyes to the extent of this problem. Let us face the situation as it is. There can be no doubt as to its final issue if based on the combined efforts of the public, patients, the medical profession, and the public health workers.

Errors in the Calculation of the Nutritive Value of Food Intake

II. Comparison of Calculated and Determined Amounts of Ascorbic Acid

CONSTANCE M. YOUNG AND E. W. McHENRY
School of Hygiene, University of Toronto

IT is customary in the course of dietary surveys to calculate the ascorbic acid content of a diet from the ascorbic acid contents of individual foods as given in food tables. For a long time it has been considered that there may be a tendency to overestimate the ascorbic acid content when average food table values are used as a basis. The amount of ascorbic acid in a food may vary a good deal for reasons that are inherent in the food itself—variety, growing conditions, ripeness, size, etc. As the vitamin is readily oxidized, methods of storage, marketing, and, more especially, of preparation, may all contribute to losses. As a result of the cumulative effect of all these factors, a food by the time it is served may easily be a much less valuable source of ascorbic acid than it is theoretically. It was thought desirable to find out how closely such theoretical, calculated values for meals as served approached actual values obtained by assay, so that an idea might be gained of how much allowance to make in estimating the ascorbic acid content of a diet.

Bessey and White (1942) reported that citrus fruits and tomatoes were the only usual reliable sources of vitamin C, and that other fruits and vegetables, while preventing scurvy, did not provide enough to give satisfactory blood plasma levels. Losses during storage and cooking might amount to as much as 70 per cent of the original ascorbic acid content, according to the results of quite extensive work by Murphy (1941). Bryan, Turner, Lotwin, and Huenemann (1940) also found a marked decrease in the ascorbic acid content of foods during preparation and serving.

In most of the work already done in an effort to estimate the changes in stored and cooked food, assays have been carried out only on individual foods, and values on mixed dishes obtained by calculation from the recipe. In the present series of assays, meals as a whole were taken, and the total ascorbic acid content determined, in order to find out what proportion of the theoretical value was present. The 21 meals which formed the basis of the tests were served in a university cafeteria, and were quite high in fruits and vegetables.

Since there were many dishes such as scalloped potatoes, spaghetti with tomato sauce, cream soups, and mixed salads, which were potential sources of vitamin C, but which introduced considerable difficulty into assays done by the usual routine of extraction and titration, the methods customarily used had to be modified. The fact that many of the extracts were both turbid

and coloured made titration impractical. In addition it was found to be unreliable for the determination of dehydro ascorbic acid, as solutions treated with, but free from, hydrogen sulphide gave a fleeting end point. The method finally adopted was a modification of that of Bessey (1938).

METHOD

The solutions for extraction and dilution were made up as described by Morell (1941). The buffers for the final dilutions were freed of copper by

COMPARISON OF ACTUAL AND CALCULATED CONTENTS OF ASCORBIC ACID IN TWENTY-ONE MEALS

Meal No.	Actual Ascorbic Acid (mg.)				Calculated Ascorbic Acid			Differences		
	Reduced	Combined	Dehydro	Total (T)	D	B	M	D–T	B–T	M–T
1	17	7	24	48	58	44	116	+10	−4	+68
2	35	−3	12	44	40	50	93	−4	+6	+49
3	26	−6	23	43	44	58	106	+1	+15	+63
4	16	4	22	42	48	32	93	+6	−10	+51
5	30	−1	12	41	52	36	90	+11	−5	+49
6	5	0	30	35	54	46	66	+19	+11	+31
7	16	0	16	32	27	28	56	−5	−4	+24
8	11	1	19	31	51	49	88	+20	+18	+57
9	15	−3	17	29	36	30	56	+7	+1	+27
10	11	1	13	25	48	47	68	+23	+22	+43
11	3	1	14	18	48	34	63	+30	+16	+45
12	9	1	8	18	17	14	17	−1	−4	−1
13	12	1	4	17	50	35	53	+33	+18	+36
14	4	1	12	17	36	27	48	+19	+10	+31
15	9	−2	10	17	20	19	30	+ 3	+2	+13
16	6	0	8	14	61	44	72	+47	+30	+58
17	7	0	7	14	24	20	29	+10	+6	+15
18	7	0	4	11	46	30	57	+35	+19	+46
19	3	3	2	8	13	10	18	+5	+2	+10
20	3	0	3	6	12	12	15	+6	+6	+9
21	2	0	2	4	34	11	40	+30	+7	+36
					Average			14.4	7.6	36.0
					Standard deviation			±13.9	±10.0	±18.9
					Median			10.4	5.6	36.6

M—values calculated from table of Munsell.
D—values calculated from table of Daniel and Munsell.
B—values calculated from table of Bryan, Turner, Lotwin and Huenemann.

treatment with sodium diethlydithiocarbamate and animal charcoal. A standard curve was made up for each set of experiments, using a solution of ascorbic acid containing 0.1 mg/ml., made up in buffer at pH 3.6 at the same time as the experiment was started. Dilutions were made to contain 0, 4, 8, and 12 gamma/ml.

Five-ml. portions of 2, 6 dichlorphenol-indophenol solution were added to a series of calibrated test tubes from a burette. The colorimeter (Coleman Universal Spectrophotometer, lambda, 520 milli mu) was set at 100 per cent transmittance (galvanometer scale reading of 100) for a tube containing 5 ml. of dye, 5 ml. of buffer, and a few crystals of ascorbic acid, the same tube being used for standardization and experimental readings. With the same

measuring pipette throughout, 5 ml. of solution was added rapidly to 5 ml. of the dye, shaken for a few seconds, and the transmittance read at 15 and 30 seconds. This process was repeated for each dilution until good checks were obtained. For pure solutions the difference between 15 and 30 second readings rarely amounted to more than 0.3 galvanometer units. The reading was corrected to zero time by the empirical equation developed by Bessey (1938), $G_s = G_{s1} - (G_{s2} - G_{s1})$, where G_{s1} represents the 15− and G_{s2} the 30-second reading. Plotting log G_s against concentration gave a straight line, from which readings of concentration could be obtained directly.

As there seemed to be no point in including, in the sample for analysis, foods known to contain no ascorbic acid, only those containing measurable amounts were selected. Combined samples representative of the vitamin C content of the entire meal were ground with metaphosphoric acid in a Waring blender. Each of duplicate samples was divided into two parts, one of which was treated with hydrochloric acid to hydrolyze combined ascorbic acid, according to the method of Reedman and McHenry (1938). After centrifuging, filtration, and adjustment to pH 3.6, aliquots were diluted for reading, and others treated with hydrogen sulphide and carbon dioxide to reduce dehydro ascorbic acid. With the galvanometer set at 100 for a combination of 5 ml. of dye plus 5 ml. of each solution plus a few crystals of ascorbic acid to decolourize the dye, readings were taken exactly as in standardization. By this method the only difference between the two tubes is the amount of unreduced dye; turbidity and colour of the solution are automatically compensated for.

Various methods were tried to clarify the extracts, many of which were so turbid that it was impossible to set the galvanometer at 100 as required. Following the suggestion of Davis (1942), filter cell was tried; it appeared to remove most of the colour, some of the turbidity, and none of the ascorbic acid, since recoveries were excellent. The solutions were by no means perfectly clear, but it was quite possible to work with them.

The method differs from those generally used in its employment of the graph of log G_s against concentration, instead of the graph of log G_s–log G_b against concentration. Results show a close similarity to those obtained by Bessey, as far as per cent error is concerned, except for one case of a very turbid solution with a low ascorbic acid content, and even here the absolute error is not very great. With clear solutions, determinations gave exact duplication of results, where the transmittance was 100 per cent compared with water. When this was reduced to 60 per cent by colour and turbidity, the per cent error varied from 1.9 to 5.6; reducing the transmittance to 23 for the G_{sr} reading increased the error to 5.0 per cent for a concentration of 8 gamma/ml. and 20 per cent for 2 gamma/ml. In the last case the correct value was 2.0 and that read 2.4.

Probably results with similar solutions are trustworthy only within wider limits than would be permitted for clearer solutions or ones of higher concentration. Owing to the nature of the curve, it is doubtful whether any method involving differential readings in the lower ranges of the galvanometer

scale would give markedly better results. In addition, the standard curve varied somewhat as to slope and considerably in the frequency with which the reading for zero concentration of ascorbic acid fell on or off the line of best fit. This last fact seems to throw some doubt on the reliability of estimates made on the basis of a log G_s–log G_b curve, where only one basic standard curve is employed, and all experimental determinations depend on the accuracy of a zero reading.

In calculation of the theoretical ascorbic acid contents of the meals three sets of tables were used: those given by Munsell in the Milbank Quarterly, (M); by Daniel and Munsell in the U.S.D.A. Misc. Publication 275, (D); and by Bryan, Turner, Lotwin, and Huenemann, in the Journal of the American Dietetic Association, (B). The values were all different, and in many cases there was a much greater difference between values for the same meal calculated from different tables than between the value found and the nearest table value. Moreover, the difference between the maximum and minimum possible values from the same table might be several times that between the found and average theoretical values. Even in cases where the value found was not within this range the recovery of added ascorbic acid was quite good.

The values calculated from the B tables were in much closer agreement with those found than the other two calculated sets. The average difference between the T and B values was only 7.6 mg., compared with 2 and 5 times as much for the other two tables. At least a partial explanation for this may lie in the fact that the values, except in the Journal of the American Dietetic Association tables, are nearly all for raw foods. However, the values in the three tables are only for reduced ascorbic acid, and the ones determined include combined and dehydro ascorbic acid as well.

Admittedly the agreement between the theoretical and found values is not good. The difference cannot all be due to cooking, as raw cabbage salad occurred in two of the seven meals showing poorest agreement. The presence of canned pineapple in four of these meals and its non-occurrence in significant amounts in all other meals might indicate that the ascorbic acid content of the brand used was rather low. The values used for cooked potatoes may also have been higher than they should have been. Allowance must also be made for inaccuracy in estimating proportions of foods in mixed dishes. Even if all these factors are taken into consideration, the values found are still well below those that might be expected. In the case of the Milbank Quarterly table the found values were only 24 per cent of the theoretical (median), compared with 61 per cent for the U.S.D.A. table and 75 per cent for the Journal of the American Dietetic Association table.

Since recovery of added ascorbic acid was quite good, the occurrence of a marked discrepancy between found and theoretical values indicates that some allowance should be made in calculations, rather than that the method is unreliable.

It appears that, generally, the values calculated from the tables in the Journal of the American Dietetic Association are much closer to the values

obtained by assay than are those in the other two tables, especially those in the Milbank Quarterly. In addition they are more evenly dispersed about the found values, and would therefore seem to be a better representation of an average than the figures in the other tables.

Even in this case, however, it must be emphasized that the values found are considerably below the theoretical values. In determining the adequacy of diets in regard to vitamin C, especially where the intake is below the optimum, it might be wise to take this fact into consideration when calculations are made for ascorbic acid intakes.

This investigation was made possible by a grant from the Committee on Food Analysis of the Canadian Council on Nutrition.

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EDITORIAL SECTION

THE ANNUAL MEETING

FAR-REACHING changes are being made in the economic and social life of Canadian citizens. Never has so much thought been given to increasing the productive capacity of our country as at this moment. The great natural resources of Canada are being drawn upon as never before. The call is to produce more food, more munitions, more ships—more of all the vital war supplies. It is incumbent upon the Canadian Public Health Association, representing the medical officers of health, public health nurses, and other members of organized public health departments, to join with practising physicians in maintaining the health of our citizens. The importance of the annual meeting of the Canadian Public Health Association, to be held the first week of June, needs no emphasis. It is the opportunity for conference and discussion and the assembling of essential information concerning health needs in each province of Canada so that effective measures for the conservation of Canadian health may be taken.

The program of the thirty-first annual meeting, presented in this issue of the JOURNAL, is evidence of the thought that has been given to ensuring that this meeting will afford the opportunity to support and carry forward a national health program for Canada. The appeal is to every officer in public health to attend the meeting and to utilize it for conference and action in order that the greatest contribution in public health may be made. It is urged that every municipality assist in making possible the attendance of their medical officer of health in order that the deliberations may have the benefit of the widest representation.

The annual dinner on Monday, June 1st, will be an outstanding event. Dr. Henry F. Vaughan, Dean of the School of Public Health in the University of Michigan and formerly Commissioner of Health of the City of Detroit, will be the guest speaker. Another feature of the dinner will be the presentation of honorary life membership in the Canadian Public Health Association to two outstanding Canadian public health workers, Dr. William Warwick of Fredericton, and Dr. George D. Porter, Toronto. At this session also the plaques awarded in the 1941 Canadian Health Conservation Contests will be presented to the medical officers of the winning cities and counties.

CANADIAN PUBLIC HEALTH ASSOCIATION
Thirty-First Annual Meeting
ONTARIO HEALTH OFFICERS ASSOCIATION
Twenty-Eighth Annual Conference
ROYAL YORK HOTEL, TORONTO, JUNE 1-3, 1942

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DIRECTORY OF SESSIONS
CANADIAN PUBLIC HEALTH ASSOCIATION

President: Dr. James J. McCann, M.P., Medical Officer of Health, Renfrew, Ontario

MONDAY, JUNE 1

9.00 a.m. **Registration.** A fee of $1.00 is being charged to meet in part the expenses of the convention. Convention Foyer.

9.15 a.m. Section of Public Health Nursing. Parlor B. Program on page 234.

9.30 a.m. Section of Epidemiology and Vital Statistics. Parlor A. Program on page 235.

2.30 p.m. General Session with the Ontario Health Officers Association. Banquet Hall. Program on page 235.

6.30 p.m. Annual Dinner with the Ontario Health Officers Association. Ball Room. Program on page 236. Tickets ($1.75) on sale at the Registration Desk.

TUESDAY, JUNE 2

9.30 a.m. Section Meetings:
Epidemiology and Vital Statistics. Parlor A. Program on page 237.
Public Health Nursing and Industrial Hygiene. Parlor B. Program on page 237.

2.30 p.m. General Session with the Ontario Health Officers Association. Banquet Hall. Program on page 238.

8.00 p.m. Meeting of the Executive Council. Parlor A. All members of the Association are welcome.

WEDNESDAY, JUNE 3

9.30 a.m. Section Meetings:
Epidemiology and Vital Statistics (session with the Ontario Health Officers Association). Banquet Hall. Program on page 238.
Public Health Education. Parlor A. Program on page 239.

12.15 p.m. Luncheon with the Ontario Health Officers Association. Roof Garden. Tickets ($1.10) on sale at the Registration Desk.

2.30 p.m. General Session with the Ontario Health Officers Association. Banquet Hall. Program on page 239.

A Message from the President of the Canadian Public Health Association

The Canadian Public Health Association extends a cordial invitation and a warm welcome to its thirty-first annual convention. Today, the need for conservation of health and physical fitness is greater than at any time in the nation's history. Canada's war effort demands that all our resources, material and human, must be used to achieve final victory and nothing in the achievement of that objective is of more importance than the maintenance of the physical and mental health of the civil population from which the military and industrial personnel is extracted. Already over two thousand civilian physicians have answered the call to the country's armed forces and another eight hundred are required this year. To those who remain this offers a challenge to maintain and improve our standards of public health service. The Canadian Public Health Association accepts that challenge and will, with your assistance and co-operation, carry on with renewed vigor and enthusiasm.

James M. Cram

DIRECTORY OF SESSIONS

ONTARIO HEALTH OFFICERS ASSOCIATION

President: H. B. KENNER, M.D., Medical Officer of Health, Stratford
Captain, Royal Canadian Army Medical Corps

MONDAY, JUNE 1

9.00 a.m. Executive Meeting.

9.00 a.m. **Registration.** A fee of $1.00 is being charged to meet in part the expenses of the convention.

9.00 a.m. Films. BANQUET HALL.

10.15 a.m. First Session. BANQUET HALL. Program on page 234.

2.30 p.m. General Session with the Canadian Public Health Association. BANQUET HALL. Program on page 235.

6.30 p.m. Annual Dinner with the Canadian Public Health Association. BALL ROOM. Program on page 236. Tickets ($1.75) on sale as the Registration Desk.

TUESDAY, JUNE 2

9.00 a.m. Medical Officers of Health may attend the following programs:

(1) Guided Discussion: Some Local Health Problems. Chairman: Dr. A. E. BERRY. BANQUET HALL.

(2) Meeting of the Sections of Public Health Nursing and Industrial Hygiene. PARLOR B. Program on page 237.

(3) Meeting of the Section of Epidemiology and Vital Statistics. PARLOR A. Program on page 237.

2.30 p.m. General Session with the Canadian Public Health Association. BANQUET HALL. Program on page 238.

WEDNESDAY, JUNE 3

9.30 a.m. Program arranged by the Section of Epidemiology and Vital Statistics of the Canadian Public Health Association. BANQUET HALL. Program on page 238.

Program arranged by the Public Health Education Section of the Canadian Public Health Association. PARLOR A. Program on page 239.

12.15 p.m. Luncheon Meeting with the Canadian Public Health Association. ROOF GARDEN. Tickets ($1.10) on sale at the Registration Desk.

2.30 p.m. General Session with the Canadian Public Health Association. BANQUET HALL. Program on page 239.

DIRECTORY OF SESSIONS

CANADIAN INSTITUTE OF SANITARY INSPECTORS

(ONTARIO BRANCH)

President: D. S. McKee, C.S.I.(C.)
Chief Sanitary Inspector, Province of Ontario

MONDAY, JUNE 1

9.00 a.m. **Registration.** A fee of $1.00 is being charged to meet in part the expenses of the convention. Convention Foyer.

10.15 a.m. Joint Session with the Ontario Health Officers Association. Banquet Hall. Program on page 234.

2.00 p.m. Executive Meeting. Parlor C.

TUESDAY, JUNE 2

9.30 a.m. Morning Session. Parlor C.

The Influence of Physical Environment on the Public Health. Hugh McIntyre, A.R.San.I., C.S.I.(C), Kirkland Lake.

The Education of Food Handlers. A. G. MacNab, C.S.I.(C.), Westmount, Que.

The Sanitary Inspector and Public Relations. M. Matthews, C.S.I.(C.), Toronto.

2.00 p.m. Afternoon Session. Parlor C.

Milk Control on the Farm, with special reference to that exercised by the Department of Public Health of the City of Toronto. J. Franklin Lavery, V.S.

Rats and Other Vermin. Gordon Miller, C.S.I.(C.), Windsor.

Bedding Regulations. Sydney Pye, C.S.I.(C.), Toronto.

WEDNESDAY, JUNE 3

9.30 a.m. Annual Meeting of the Ontario Branch of the Canadian Institute of Sanitary Inspectors. Parlor C.

Mr. S. W. George, C.S.I.(C.), Vancouver, President of Institute, will discuss some of the problems of the sanitary inspector.

A cordial invitation is extended the members of the Institute to attend the annual dinner of the Canadian Public Health Association and the Ontario Health Officers Association (Monday, 6.30, Ball Room) and the annual luncheon (Wednesday, 12.15, Roof Garden), as well as any of the other sessions in which they may be interested.

GENERAL INFORMATION

Registration. All delegates and guests are expected to register. A fee of $1.00 is being charged to meet in part the expenses of the convention. Registration Desk: Convention Foyer.

The scientific sessions, the annual dinner, and the luncheon will start promptly at the hour indicated in the program. Members can assist by planning their schedule in advance and *by being on time.* The following procedure is suggested:

1. Check the sessions which you wish to attend.
2. Buy your tickets for the annual dinner and for the luncheon as soon as possible. The accommodation is limited. Tickets on sale at the Registration Desk.

The Annual Dinner

The annual dinner of both associations will be held in the BALL ROOM on Monday, June 1st, at 6.30. The speaker will be DR. HENRY F. VAUGHAN, Dean, School of Public Health, University of Michigan, and formerly Commissioner of Health of Detroit. The awards in the 1941 Canadian Health Conservation Contests will also be presented at this session. The wives of members are cordially invited. Dress is informal.

Tickets may be obtained at the Registration Desk for $1.75 up to the hour of 5.00 P.M.

The Luncheon

The annual luncheon of both associations will be held in the ROOF GARDEN on Wednesday, June 3rd, at 12.15 P.M. Tickets ($1.10) will be on sale at the Registration Desk from 9.00 A.M. Monday.

MONDAY, JUNE 1 - 9.00 A.M.

ONTARIO HEALTH OFFICERS ASSOCIATION

BANQUET HALL

9.00 a.m. Executive Meeting.

9.00 a.m. **Registration.** CONVENTION FOYER.

9.00 a.m. Films. BANQUET HALL.

10.15 a.m. Legislation of the 1942 Session. DR. B. T. MCGHIE, Deputy Minister of Health.

10.30 a.m. Presidential Address. H. B. KENNER, M.D., Captain, R.C.A.M.C.; Medical Officer of Health, Stratford, Ontario; President, Ontario Health Officers Association.

Appointment of Committees.

Hygiene. Chairman: DR. J. GRANT CUNNINGHAM, Director,

10.45 a.m. Appointment of Committees.

10.45 a.m. Round-Table Discussion on Two Outstanding Topics in Industrial Hygiene. Chairman: DR. J. G. CUNNINGHAM, Director, Division of Industrial Hygiene.

1. Fumigation and the changes required by the new regulations.
2. The Medical Officer of Health views the health of the worker—as reported by surveys in Ontario plants.

11.30 a.m. Detailed analysis of the revised Venereal Disease Prevention Act as it affects the M.O.H. DR. W. H. AVERY, Consultant, Venereal Disease Control.

10.45 a.m. Veterinary Inspection Services. Section Meeting. PARLOR D.

MONDAY, JUNE 1 - 9.15 A.M.

SECTION OF PUBLIC HEALTH NURSING

CANADIAN PUBLIC HEALTH ASSOCIATION

PARLOR B

Chairman: MISS MARY B. MILLMAN, School of Nursing, University of Toronto

Business Session.

MONDAY, JUNE 1 - 9.30 A.M.

SECTION OF EPIDEMIOLOGY AND VITAL STATISTICS

CANADIAN PUBLIC HEALTH ASSOCIATION

PARLOR A

Conference in Vital Statistics

Chairman: DR. J. WYLLIE, Professor of Preventive Medicine, Queen's University, Kingston

Report of the Committee on Confidential Death Certification. DR. PAUL PARROT, Demographer, Ministry of Health and Social Welfare, Province of Quebec, and Chairman of the Committee.

Plans in Vital Statistics. MR. J. T. MARSHALL, Chief, Vital Statistics, Dominion Bureau of Statistics, Ottawa.

Application of Micro-film to the Work of a Division of Vital Statistics. MR. J. D. B. SCOTT, Director of Vital Statistics, Provincial Board of Health, Victoria, B.C.

Discussion.

MONDAY, JUNE 1 - 2.30 P.M.

GENERAL SESSION

CANADIAN PUBLIC HEALTH ASSOCIATION

ONTARIO HEALTH OFFICERS ASSOCIATION

BANQUET HALL

Chairman: H. B. KENNER, M.D., Captain, R.C.A.M.C.; President, Ontario Health Officers Association

Film.

Presidential Address. DR. J. J. MCCANN, M.P., Renfrew, Ontario. President, Canadian Public Health Association.

The Immunization Program of the Royal Canadian Air Force. Squadron Leader A. H. SELLERS, R.C.A.F. Medical Branch, Ottawa.

The Epidemiology of Venereal Disease. DR. J. E. LEROUX, Division of Venereal Disease Control, Provincial Board of Health of British Columbia, Vancouver.

Observations in Britain in reference to the Health of Children. DR. C. M. HINCKS, Director, Canadian National Committee for Mental Hygiene, Toronto. (With film presentation.)

Health Services in the Secondary School. DR. L. A. PEQUEGNAT, Deputy Medical Officer of Health, Toronto.

Film.

MONDAY, JUNE 1 - 6.30 P.M.

ANNUAL DINNER

CANADIAN PUBLIC HEALTH ASSOCIATION

ONTARIO HEALTH OFFICERS ASSOCIATION

Chairman: DR. J. J. MCCANN, M.P., President of the Canadian Public Health Association

Speaker: DR. HENRY F. VAUGHAN, Dean, School of Public Health, University of Michigan, formerly Commissioner of Health of Detroit.

Presentation of honorary life membership in the Canadian Public Health Association to DR. GEORGE D. PORTER, Toronto, and DR. WILLIAM WARWICK, Fredericton.

Presentation of the awards in the 1941 Canadian Health Conservation Contests, conducted by the Canadian Public Health Association in co-operation with the American Public Health Association:

THE CITY CONTEST

GROUP 1: *Cities over 100,000 population with full-time services* Hamilton, Ontario; Windsor, Ontario.

GROUP 2: *Cities under 100,000 with a full-time medical officer:* No award.

GROUP 3: *Cities under 100,000 with a part-time medical officer:* St. Catharines, Ontario.

THE RURAL CONTEST

Western Division: Red Deer Health Unit, Red Deer, Alberta.

Eastern Division: Arthabaska County Health Unit, Quebec; Nicolet County Health Unit, Quebec; Shefford County Health Unit, Quebec; St. Hyacinthe-Rouville Health Unit, Quebec; St. Jean-Iberville-Laprairie-Napierville Health Unit, Quebec.

TUESDAY, JUNE 2 - 9.30 A.M.

ONTARIO HEALTH OFFICERS ASSOCIATION

Medical Officers of Health may attend the following programs:

(1) Guided Discussion: Some Local Health Problems. Chairman: DR. A. E. BERRY. BANQUET HALL.

(2) Veterinary Inspection Services. PARLOR D.

(3) Meeting of the Sections of Public Health Nursing and Industrial Hygiene. PARLOR B. See program of Sections.

(4) Meeting of the Section of Epidemiology and Vital Statistics. PARLOR A. See program of Section.

TUESDAY, JUNE 2 - 9.30 A.M.

SECTIONS OF PUBLIC HEALTH NURSING AND INDUSTRIAL HYGIENE CANADIAN PUBLIC HEALTH ASSOCIATION

PARLOR B

Chairmen: MISS M. B. MILLMAN, School of Nursing, University of Toronto, and DR. J. G. CUNNINGHAM, Director, Division of Industrial Hygiene, Department of Health of Ontario

Effect on Community Health of Employment of Parents for War Purposes

1. *Effect on the Home.* MRS. A. HAYGARTH, Director of Public Health Nursing Services, Department of Public Health, Hamilton.
2. *Nutrition:*
   (*a*) *In the Home.* DR. E. W. MCHENRY, Associate Professor of Physiological Hygiene, University of Toronto.
   (*b*) *At Work:*
   The Industrial Medical Officer. Speaker to be announced.
   The Dietitian. MRS. V. G. IGNATIEFF.
3. *Care of Children:*
   (*a*) *Organization of Nursery Schools.* MISS B. TOUZEL, Executive Secretary, Welfare Council of Greater Toronto.
   (*b*) *Minimum Standards in regard to Personnel and Program of Nursery Schools.* DR. MARY L. NORTHWAY, Institute of Child Study, University of Toronto.
4. *Co-ordination of Effort.* MISS EDNA L. MOORE, Chief Public Health Nurse, Division of Child Hygiene and Public Health Nursing, Department of Health of Ontario, Toronto.

Discussion.

TUESDAY, JUNE 2 - 9.30 A.M.

SECTION OF EPIDEMIOLOGY AND VITAL STATISTICS CANADIAN PUBLIC HEALTH ASSOCIATION

PARLOR A

Chairman: DR. J. WYLLIE, Professor of Preventive Medicine, Queen's University, Kingston

Report of the Committee on Full-Time Health Services, Canadian Public Health Association. DR. R. D. DEFRIES, Director, School of Hygiene and Connaught Laboratories, University of Toronto.

Detection of Tuberculosis in School Teachers in the Province of Quebec. DR. LASALLE LABERGE, Division of Tuberculosis, Ministry of Health and Social Welfare, Province of Quebec.

New Horizons in the Problem of Infantile Mortality. DR. PAUL PARROT, Demographer, Ministry of Health and Social Welfare, Province of Quebec.

The Control of Tuberculosis in Canada in Wartime. DR. G. J. WHERRETT, Executive Secretary, Canadian Tuberculosis Association, Ottawa.

An Outbreak of Paratyphoid Fever in the City of North Battleford, Sask. DR. R. O. DAVISON, Deputy Minister of Public Health.

A Combined Outbreak of Septic Sore Throat and Diphtheria. DR. G. G. SIMMS, Department of Public Health of Nova Scotia, Pictou.

Diphtheria Toxoid and the Reinforcing Dose. DR. JOHN R. WILKEY, School Medical Officer, London.

TUESDAY, JUNE 2 - 2.30 P.M.

GENERAL SESSION

ONTARIO HEALTH OFFICERS ASSOCIATION
CANADIAN PUBLIC HEALTH ASSOCIATION

BANQUET HALL

Chairman: DR. J. J. MCCANN, M.P.

Recent Studies in Influenza. DR. RONALD HARE, Research Associate, Connaught Laboratories, University of Toronto.

Statistical Study of Maternal and Infant Mortality in Canada since 1926. DR. ERNEST COUTURE, Director, Division of Maternal and Infant Hygiene, Department of Pensions and National Health, Ottawa.

A.R.P. Work (Medical Services) in Montreal. DR. ADELARD GROULX, Director, Department of Health of Montreal.

Health Matters in National Defence Areas. DR. ALLAN R. MORTON, Commissioner of Health, Halifax.

A Nutritional Program for Canada in Wartime. DR. L. B. PETT, Director of Nutrition Services, Department of Pensions and National Health, Ottawa.

Films.

TUESDAY, JUNE 2 - 8.00 P.M.

MEETING OF THE EXECUTIVE COUNCIL
CANADIAN PUBLIC HEALTH ASSOCIATION

PARLOR A

Presentation of reports and plans for 1942-43.

WEDNESDAY, JUNE 3 - 9.30 A.M.

ONTARIO HEALTH OFFICERS ASSOCIATION
and
SECTION OF EPIDEMIOLOGY AND VITAL STATISTICS
CANADIAN PUBLIC HEALTH ASSOCIATION

BANQUET HALL

Chairman: DR. J. WYLLIE, Professor of Preventive Medicine, Queen's University, Kingston

An Epidemic of Diphtheria in Scarborough Township. DR. C. D. FARQUHARSON, Medical Officer of Health, Agincourt, Ontario.

A Cheese-borne Typhoid Epidemic. DR. JACQUES GAUTHIER, Director, Champlain County Health Unit, Cap de la Madeleine, Quebec, and DR. A. R. FOLEY, Epidemiologist, Ministry of Health and Social Welfare, Province of Quebec.

An Epidemic of Typhoid Fever due to Cheese. DR. MAXWELL BOWMAN, Epidemiologist, Department of Health and Public Welfare of Manitoba, Winnipeg.

A Tuberculosis Fact-Finding Study in the London Secondary Schools. DR. JOHN R. WILKEY, School Medical Officer, London.

Scarlet Fever Immunization in Windsor. DR. JOHN HOWIE, Medical Officer of Health, Windsor.

Diphtheria in Nova Scotia. DR. J. J. MACRITCHIE and DR. ELDON EAGLES, Department of Public Health of Nova Scotia.

Interpretation of Laboratory Findings re Diagnostic Specimens. DR. A. L. MACNABB, Director, Division of Laboratories, Department of Health of Ontario.

WEDNESDAY, JUNE 3 - 9.30 A.M.

PUBLIC HEALTH EDUCATION SECTION
CANADIAN PUBLIC HEALTH ASSOCIATION

PARLOR A

Chairman: MISS MARY POWER, Department of Health of Ontario

Health Education Films.

The Interest of the Public in Health. DR. D. W. GUDAKUNST, Medical Director, The National Foundation for Infantile Paralysis, Inc., New York.

Educational Techniques for Nutrition. Dr. L. B. PETT, Director of Nutrition Services, Department of Pensions and National Health, Ottawa.

Printed Matter in Health Education. DR. NORMAN L. BURNETTE, Assistant Secretary, Metropolitan Life Insurance Company, Ottawa.

Utilizing Service Clubs, Women's Organizations, and Other Local Organizations. DR. D. V. CURREY, Medical Officer of Health, St. Catharines, Ontario.

Experiences of an Acting Medical Officer of Health in Peterborough, Ontario. DR. DOUGLAS B. AVISON, Acting Medical Officer of Health, Peterborough.

Health Education Films.

WEDNESDAY, JUNE 3 - 12.15 P.M.

LUNCHEON

CANADIAN PUBLIC HEALTH ASSOCIATION
ONTARIO HEALTH OFFICERS ASSOCIATION

ROOF GARDEN

Tickets ($1.10) will be on sale at the Registration Desk.

WEDNESDAY, JUNE 3 - 2.30 P.M.

GENERAL SESSION

CANADIAN PUBLIC HEALTH ASSOCIATION
ONTARIO HEALTH OFFICERS ASSOCIATION

BANQUET HALL

Chairman: DR. J. J. MCCANN, M.P., Renfrew
President, Canadian Public Health Association

Film.

Poliomyelitis:

Sources and Modes of Infection. DR. JAMES CRAIGIE, Research Associate, Connaught Laboratories, University of Toronto.

Control and Treatment. DR. D. W. GUDAKUNST, Medical Director, The National Foundation for Infantile Paralysis Inc., New York.

Encephalitis:

Nature of the Infection. DR. G. D. W. CAMERON, Chief, Laboratory of Hygiene, Department of Pensions and National Health, Ottawa.

Clinical and Epidemiological Findings in the Outbreak in Western Canada in 1941. DR. C. R. DONOVAN, Department of Health and Public Welfare of Manitoba, Winnipeg. DR. R. O. DAVISON, Deputy Minister of Public Health for Saskatchewan, Regina.

Film.

FORTY-SECOND ANNUAL MEETING

CANADIAN TUBERCULOSIS ASSOCIATION

held in conjunction with the

ONTARIO LAENNEC SOCIETY

JUNE 5th and 6th, 1942

ROYAL CONNAUGHT HOTEL HAMILTON

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FRIDAY, JUNE 5

a.m. **Meeting of Presidents of Boards and Superintendents of the Sanatoria in Ontario.**

12.30 p.m. **Luncheon. Annual Meeting, Canadian Tuberculosis Association.**

2.00 p.m. **Seal Sale Conference.**

2.00 p.m. **Medical Session:**

The Tuberculosis Program in Niagara Peninsula. DR. C. G. SHAVER, Medical Superintendent, Niagara Peninsula Sanatorium.

Four-year Survey of Tuberculosis Institutions in Canada. DR. G. J. WHERRETT, Executive Secretary, Canadian Tuberculosis Association.

Statistics and Tuberculosis. MR. J. T. MARSHALL, Chief of Vital Statistics Branch, Dominion Bureau of Statistics.

Case-Finding Surveys in Ontario. DR. K. M. SHOREY, Division of Tuberculosis Prevention, Ontario Department of Health.

Health Survey of Toronto University Students. DR. IAN URQUHART, Director of Student Health Service, University of Toronto.

Examination of Teachers. DR. GEORGES GREGOIRE, Quebec.

Tuberculin Patch Test Surveys in a Small College. DR. J. S. ROBERTSON, Divisional Medical Officer of Health, Nova Scotia Department of Health.

Tuberculosis and the Indian. DR. P. E. MOORE, Director of Medical Services, Indian Affairs Branch.

8.00 p.m. **Meeting of Executive Council.**

SATURDAY, JUNE 6

9.00 a.m. **Relationship between Genito-Urinary Tuberculosis and Bone and Joint Tuberculosis.** DR. KENNETH F. DAVIS, Weston Sanatorium.

Report on Cavity Drainage—Monaldi Method. DR. D. B. AITCHISON, Mountain Sanatorium.

Proctology in a Sanatorium. DR. F. B. BOWMAN, Hamilton.

Experimental Work on Volle Bacillus. DR. DUDLEY IRWIN, Banting Institute, Toronto.

Chronogenic Cultures of Acid Fast Bacilli. DR. M. VIOLA RAE, Mountain Sanatorium.

Tuberculosis and the Army. Speakers to be announced.

2.00 p.m. **Ontario Laennec Society:**

Ten Years' Experience in Phrenic Nerve Operations. DR. CLARA WONG, Mountain Sanatorium.

Recognition of Right Heart Strain. DR. A. S. KENNEDY, Hamilton.

Silicosis. DR. A. R. RIDDELL, Ontario Department of Health.

Abnormal Chest Films. DR. W. J. CRYDERMAN, Toronto.

Series of Short Case Histories.

7.00 p.m. **Annual Dinner—Ontario Laennec Society.**
Speaker: DR. N. S. SHENSTONE, Toronto: **Pneumonectomy.**

Cancer

IF cancer is present, the earlier it is discovered and properly treated, the greater are the chances for a cure. The chances of curing **early** cancer of the breast, for example, are almost four times greater than those of curing it in its late stages; in early cancer of the pelvic regions, the chances are **eight** times better.

That is why anyone with a suspicious cancer symptom should go to the doctor immediately—should never "wait and see what happens." Fortunately, those cancers which give easily recognizable danger signals are usually the ones which can be treated most successfully. Here are some of the danger signals:

1. Any unusual lump or thickening, especially in the breast.
2. Any irregular or unexplained bleeding.
3. Any sore that does not heal — particularly about the mouth, tongue, or lips.
4. Persistent indigestion, often accompanied by loss of weight.
5. Noticeable changes in the form, size, or colour of a mole or wart.
6. Any persistent change from the normal action of elimination.

The only positive way to tell whether cancer is present is a microscopic examination. If cancer is present, there are three forms of treatment — surgery, X-rays, radium, or a combination of these. Beware of quack remedies or "cures" for any condition which might be cancer.

Metropolitan will send you, on request, a free booklet, "A Message of Hope about Cancer."

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Chairman of the Board

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